ELECTRICAL REVIEW

May 16, 1947

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Managing Editor :
Hugh S. Pocock, M.I.E.E.

Technical Editor : C. O. Brettelle, M.I.E.E.

Industrial Editor : J. H. Cosens

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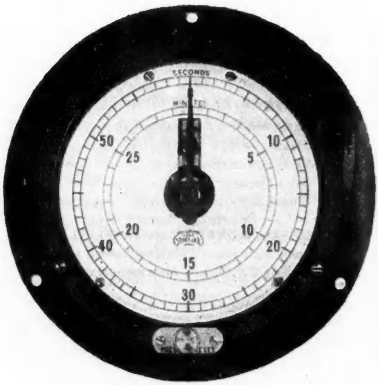

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXL. No. 3625 MAY 16, 1947 9d. WEEKLY

Wages and Hours

Improvements Since 1938

AT the Annual Conference of the Electrical Trades Union last week, the general president (Mr. F. Foulkes) said that " the Government must be made to realize that the pressure for more wages in the electrical industry must remain constant until such times as the industry was able to prove that non-producers were not in a more favourable economic position than those who worked and created the profits."

If the meaning of this is not altogether clear the intention is plain and the statement was followed by the adoption of a resolution calling for a 42½ hour week as an intermediate step towards forty hours in a five-day week. It is very difficult to arrive at a fair estimation of the justice of the claims for higher wages and shorter hours, for the criterion may be chosen according to one's point of view and available statistics are hedged about by so many qualifications and obscurity that their value is questionable. Yet such as they are they should be examined even if no definite conclusions can be drawn from them.

Ministry of Labour Inquiry

The April *Ministry of Labour Gazette* sets out the result of a questionnaire on hours and wages made in October last to which about 51,500 industrial establishments, with 5½ million employees replied. It did not cover coal mining, the railway service, dock labour, or distributive and commercial employment. The tabulated statistics differentiate between male and female and adult and juvenile employees. For simplicity and because, mainly, it is adult male labour which the E.T.U. represents, we take only the hours and wages of men over twenty-one years of age.

In electrical engineering, figures for 75,915 adult males are given and it is shown that the average weekly earnings in October last were 129s. 8d.; the number of hours worked (including overtime) was 48 and the average hourly earnings 32·4d. The average increases in earnings as compared with October, 1938, were 74 per cent weekly and 79 per cent hourly.

Electrical Contracting and Supply

A total of 5,028 male adult workers (average earnings 126s. 9d. a week) is given for the electrical wiring and contracting industry. Their average number of hours worked was 49·2 and hourly earnings were 30·9d. The average increase in weekly earnings since 1938 is given as 60 per cent and the hourly increase as 61 per cent. For the electricity supply industry a total of 78,413 male adults who earned an average of 117s. 3d. a week is given. The average number of hours worked was 49·8 and the average hourly earnings 28·3d. Since 1938 earnings had risen by 62 per cent weekly and 60 per cent hourly.

The electrical apparatus, cable, lamp, etc., manufacturing industry is different from the other branches in that the adult males represent only about a half of the total employed. There were 55,884, earning an average of 127s. 3d. weekly. Their average week was 49·2 hours for which they were paid 31·0d. per hour. The rises in hourly and weekly wages have been 78 and 74 per cent.

It will naturally be asked how these branches of the electrical industry stand in relation to other trades and with the industry as a whole. The *Gazette* shows that for the adult male workpeople covered the average weekly hours worked were 47·6, the average weekly earnings 120s. 9d. and the hourly earnings 30·4d. The last two figures represent increases of 75 per cent in each case as compared with October, 1938. So far as can be judged, the occupations for which wages have been increased by more than the average are, first, in those industries in which conditions prevailing before the war had depressed wages (e.g., shipbuilding and textiles) and, secondly, the less skilled occupations (as in quarrying, brickworks, and lime-kilns). With regard to the first class there is justice in the improvement. The second indicates a levelling-up process which may not always be to the taste of craftsmen and may adversely influence recruitment to the skilled occupations.

This Year's B.I.F.

THE British Industries Fair ends to-day. It has been well patronized by visitors from home and overseas and there have been many inquiries which are likely to lead to purchases, especially from Scandinavia, Switzerland and India. Results of the Fair can never be gauged accurately; they continue to accrue long after the event, and this is particularly true where export business is concerned. One aspect of the Fair is that it enables the visitor to compare the similar products of different makers and to assess progress since the last show. To aid in this comparison and assessment we publish reviews of the industrial and domestic products shown, with notes on installation accessories.

I.M.E.A. Convention

THERE is quite a pre-war air about the Bournemouth Convention programme sent out last week by the Incorporated Municipal Electrical Association. As we have already indicated, the arrangements follow closely those of previous conventions and include a reception and dance, banquet and ball, an E.A.W. luncheon, two papers and an exhibition. Some attractive excursions are being arranged and, given good weather, the 1,600 people who are expected to attend should find the gathering well up to the I.M.E.A.'s high standard.

Trade with Russia

UPON his return from Russia last year, Sir George Nelson (chairman of the English Electric Co.) told us that he found the Russians very anxious to do business with this country, but prices, delivering and conditions of contract had to be discussed further. Now Mr. J. Harold Wilson, leader of a British trade delegation to Moscow, has stated that further progress has been made towards settlement of these questions. Indeed he is reported to have said that the latest talks would permit of the prompt completion of a pending contract for over a million pounds' worth of electrical equipment which was negotiated by Sir George Nelson last August.

Standard Generation

WITH the object of speeding up the building of sorely needed generating sets, some standardization is undoubtedly a present necessity. Nevertheless the adoption of even "the best standards," as advocated by Mr. Herbert Morrison recently, may check progress. Stabilization in excess of the limits set by the British Standards Institution brings the risk of mortgaging future prospects to immediate advantages. Some flexibility will, however, be permitted, as the recent report of the Central Electricity Board showed that a restricted amount of experimental plant for higher steam conditions will carry on the tradition of technical progress.

Horse-Power Margins

REASONABLY good peak-load power factor in a factory depends very much on a choice of motors with ratings that correspond as nearly as practicable to the horse-power required by the driven machines. The satisfactory overall figure of 0·8 lagging obtained in the viscose rayon factory described by Messrs. C. F. Freeman and H. V. Mather in their I.E.E. Installations Section paper last night was obtained by attention to this point. All except four of the 600 motors installed are induction machines and a large proportion of the load consists of centrifugal pumps. The horse-powers of the motors in the latter case are often, the authors have found, up to 25 per cent in excess of those calculated by the pump makers after allowing margins on specified loads and deliveries.

Aids to Production

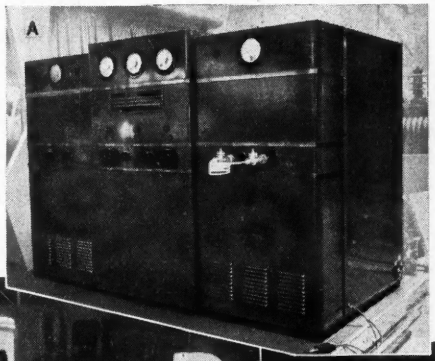
Industrial Pointers at the Fair

BEFORE the war we became accustomed to using the British Industries Fair at Birmingham as our year to year measure of the evolutionary trend of development of electrical equipment. The eight-year break is expressed by the industrial electrical exhibits this year in two opposing ways. On the one hand there are many types of standard pre-war products such as motors which, in the main, to-day are as they were in 1939 while on the other hand there are many exhibits of the war-time developments, the appearance of which "in public" for the first time suggests revolutionary change rather than evolutionary trend.

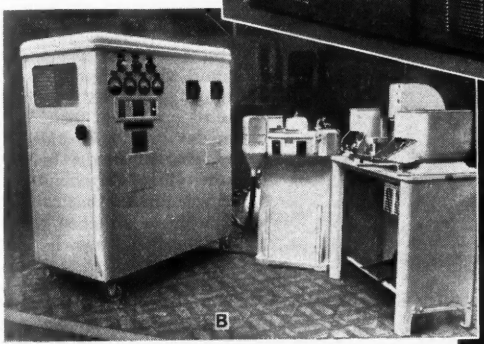
These recent developments are almost entirely concerned with quantity production, and they very largely stress the picture the *Electrical Review* has endeavoured to present of modern production in which a new meaning is being given to materials handling during processing, in that it is essentially part of the processing, and in which electrical development is the essential mainstay of the new order. Because of this we have decided to write this review of the industrial exhibits around this conception of modern "electric" production, especially in view of the paramount need at the present time of ever greater output.

The first place in these new classes of exhibits is easily taken by high-frequency heating, and in connection with this we must first mention the serious need for some standardization of terms. Such terms as high-frequency heating, radio-frequency heating, radio heating, electronic heating, and even wireless heating are causing a good deal of confusion at this early stage of development.

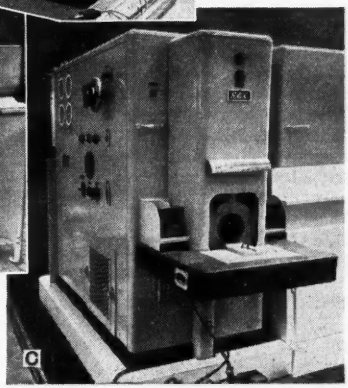
The high-frequency heating equipment for processing on metals is essentially equipment for flow-line and quantity production, and



A.—Philips Lamps demonstrated the brazing of caps on the sheaths of immersion heaters by this 50-kW equipment

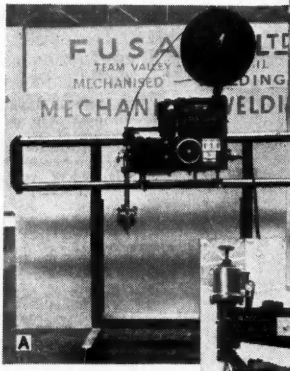


B.—Soldering nuts and caps of car distribution units was shown on the Wild-Barfield stand



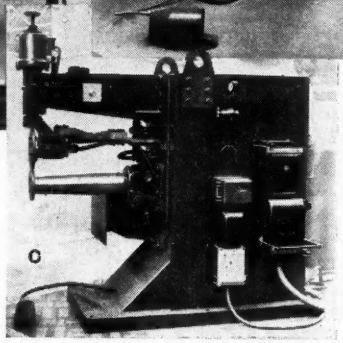
C.—G.E.C. 5-kW h.f. generator applied to tool tipping

most of it is of the valve-generator type, each unit being self-contained with its step-up transformer serving a mercury rectifier and finally an oscillator from which the h.f. supply is delivered direct to the heater coils. Standard Telephones & Cables, Ltd., showed us some very interesting examples of heat-treatment work pieces set in heating coils, with indications of the depths of penetration. In pointing out that 400 kc/s appeared to be becoming the generally accepted frequency Mr. Eadon-Clarke laid stress upon the fact that although the higher frequencies offer the advantage of shallower penetration it is possible to use them only where the time of application is small, say, less than one second. Otherwise the heat conduction into the metal tends to cancel out the advantage which is derived from the use of high frequency.



A.—Fusarc "Tractor" welding head.

B.—Infinitely variable speed converts a spot welder into a stitch welder (*Holden & Hunt*)



C.—Machine welding in the production line is represented by a Sciaky seam welder

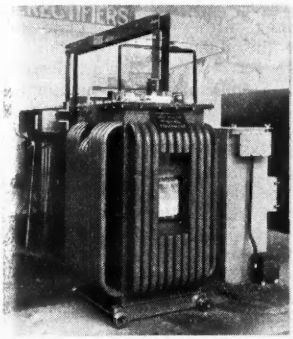
The production flow line is well represented on the stand of Wild-Barfield Electric Furnaces, Ltd., where a Ferranti-Wild-Barfield 7-kW h.f. equipment is applied to the soldering together of the nuts and caps of car distribution units. A pneumatic press assembles the components and a ring of solder, and the heat treatment takes place on a rotary table with loading, heating, cooling and ejecting stations. Each assembly is halted within the heater coil field at the heating station for a pre-determined time, and the production is one in every ten seconds. The machine is exhibited by the courtesy of Joseph Lucas, Ltd.

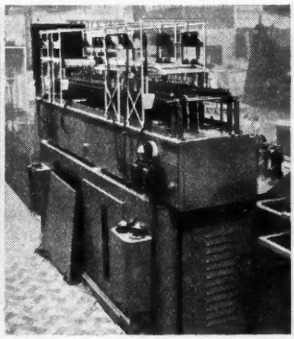
Philips Lamps, Ltd., demonstrated to us the brazing of caps on the sheaths of Aidas immersion heaters. Each cap is brazed in seven seconds, the operation being governed by a timer in the h.f. unit. This set has a continuous rating of 50 kW and is capable of very much higher duties such as heat-treatment work. The separate work table (not shown in the illustration) complete with the inductor system adds greatly to the flexibility of production.

A 5-kW h.f. generator on the stand of the General Electric Co., Ltd., was seen applied to tool tipping. First flux is brushed into the recess of a steel shank, after which a preform of brazing materials is put into position; then the actual tungsten carbide tip is placed in the recess, when the whole assembly is inserted in the heater coil. The h.f. is switched on by a foot pedal switch, and the process is automatically timed by a unit incorporated in the cabinet. The generator is complete with an oscillator tank coil to give the frequency required for each application, and the frequency range is 2,000 to 15,000 kc/s.

Alongside the h.f. heating development for processing on conducting materials is the similar development for treating insulating materials, mainly for pre-heating the formers for plastics mouldings in readiness for curing. In this case the actual work in position on the heating equipment forms the dielectric of a condenser, and the heating is effected by the molecular friction consequent on the

application of h.f. but this is actually generated by an oscillator circuit of which the work and the two electrodes between which the work is placed form the essential condenser. Higher frequencies are called for in this development, and the larger the electrode the lower is the generated frequency. For an electrode size of about 24 in. square such as that in a Ferranti-Wild-Barfield equipment, the frequency is about 10,000 kc/s. This particular unit is rated at 7 kW, and it has been developed for pre-heating thermo-setting and thermo-plastic preforms.





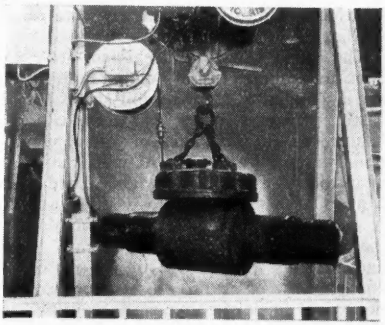
Westinghouse combined transformer and rectifier unit connected to a bank of resistances representing a plating vat. Right: One of the line-production plating exhibits, an E.F.C.O. model of continuous automatic installation

Mr. Savage (Ferranti) pointed out that pre-heating is a matter of degree, and it can be overdone and underdone. Normally there is a tendency for the preform to get hot at the outside first, and therefore for curing to commence before the introduction of the former to the mould. The much more uniform heating effected by the h.f. method overcomes this difficulty and, indeed, renders preheating really practicable, which is the essential feature towards speeding up production in this particular field.

In a plastics preheater produced by Delapena & Son, Ltd., with a performance of 2 lb of material heated to 100 deg C per minute, the power output is 2 kW and the operating frequency is 18,000 kc/s. The model H20/B plastics preheater produced by Radio Heaters is described as having an output of up to 100 B.Th.U. per minute at approximately 20,000 kc/s per second. We saw no signs of h.f. heating applied to plastics during the actual curing stage, and the general opinion appears to be that this is an unlikely development because the essential condenser formed by the electrodes and the moulding can hardly be possible in view of the application of pressure which is necessary in the course of the curing operation.

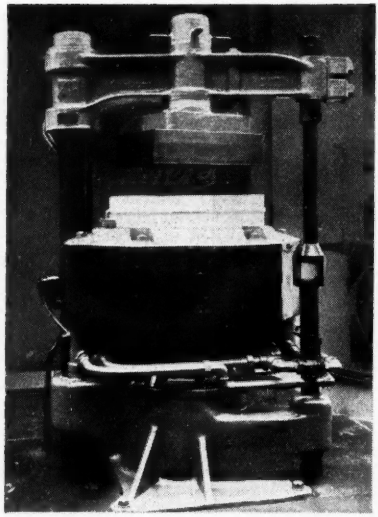
This does not exclude the electric resistance heating of platens. On the stand of George Bray & Co., Ltd., we were told that the general loading of a platen is from 10 to 12 W per sq in. of working surface. The hotplates of a self-contained press produced by the Turner Manufacturing Co., Ltd., each measure 15 in. by 15 in. by 2¼ in., and are loaded at 2 kW and equipped for thermostatic control between 200 and 400 deg F.

We should say that second place should be given to mechanized welding, particularly fusion welding, in respect to the contribution to flow line and mass production. The stationary, tractor, and deck fusion arc-welding heads exhibited by Fusarc, Ltd., are representative of the industrial models that were applied during the war to the mass production of bombs, mines, tank wheels, etc. The tractor head, which is complete with the automatic electrode feeding arrange-



The lifting magnet is important in material handling (*Electric Magnets, Ltd.*)

ments and all the controls, has roller mountings which run along a fixed tubular runway. Mr. W. J. Fisher told us, however, that the tendency now is to eliminate the fixed runway and to employ a stationary head mounted



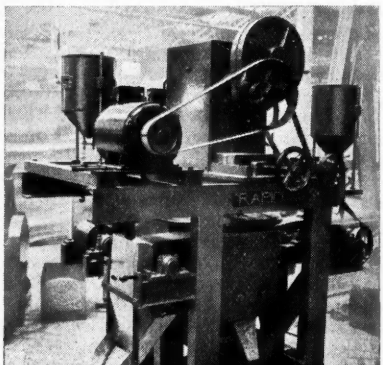
The mechanical foundry plays an extremely important part; B.I. Callender's moulding machine

upon a travelling carriage which also supports the operator and can be raised and lowered to suit varying diameters and sections of work. It can be traversed at desired welding speeds for longitudinal seams, or it can be moved at high speed to position the head for circumferential butts. Some of the peacetime applications are ship-deck construction, stanchion fabrication and pressure-vessel welding.

The broad scheme we envisage, however, does not embrace fusion welding exclusively, and a Holden & Hunt exhibit shows how a vastly increased range of work can be handled by the application of voltage regulation for speed variation. Actually the effect of introducing infinitely variable speed is to convert a spot welder into a stitch welder. A motor imparts a reciprocating motion to the movable electrode, via a crank gear, and the full speed range of the motor of 30 r.p.m. to 180 r.p.m. (one spot per revolution) gives single spotting, space spotting and seam welding. Another particularly good example of machine welding in the production line is represented by a seam welder displayed by Sciaky Electric Welding Machines, Ltd. One disc electrode at the bottom is motor driven through a gear box, but we learned that where skidding is likely when dealing with "terne" plate and aluminium the difficulty is overcome by driving both electrodes through a differential gear. An example of the production rate is that on car petrol tanks of 7 ft per min., with 18 or 20 s.w.g. material.

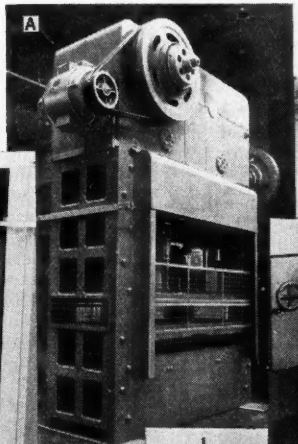
Two lay-outs representing automatic plating installations also caught our eye in respect of the line-production idea. One, an exhibit by the Electric Furnace Co., Ltd., is a model of continuous automatic plating plant with a new and more simple transfer method. There is a system of conveyor chains in a rectangular plane and the lifting frame is attached to the chains on each side of the plant. The whole system is operated by a single motor and gear unit, and the chains are stressed to a 12 to 1 ratio. The plating cycle is controlled by a time clock, and the work is conveyed through the plating tank by means of a chain conveyor which is synchronized with the transfer mechanism. The other plating plant exhibit, by the Westinghouse Brake & Signal Co., Ltd., consists of a combined transformer and rectifier unit complete with a moving-coil regulator connected to a bank of resistances representing a plating vat suitable for hard chrome plating for the tipping of tools. The plating output is 1,000 A at 7 V.

The 26-in. diameter lifting magnet (3 to 4)

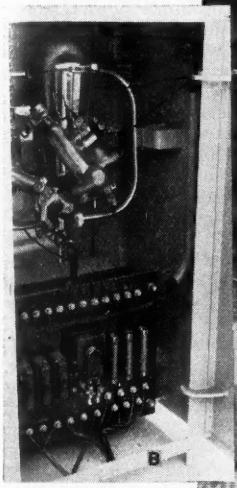


The "Rapidity" tangential electro-magnetic separator for feebly magnetic ores

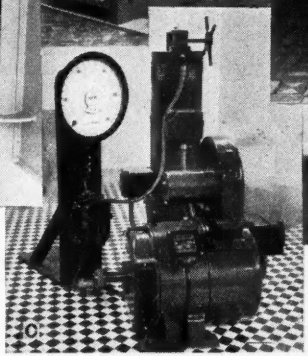
tons solid load) demonstrated by Electric Magnets, Ltd., is a reminder that the importance of the lifting magnet must not be overlooked when dealing with material-handling plant. We should say, however, that the highlight of the exhibition from this particular angle is the electrically driven floor-type steel-furnace charging machine which is shown by the Wellman Smith Owen Engineering Corporation, Ltd., in full operation with its intricate motions. Coal production has a particular significance now, and a 200-kVA mining transformer shown by the Metropolitan-Vickers Electrical Co., Ltd., is a reminder that modern underground coal conveying is a highly specialized branch of " electric " material handling.



A. — Motor-operated equipment in the engineering section is represented by this 200-ton press (*Wilkins & Mitchell*)

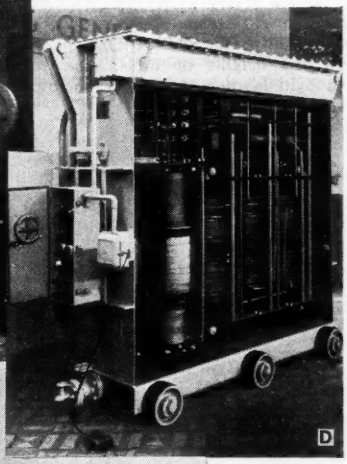


B.—E.C.C."Varispeed" equipment

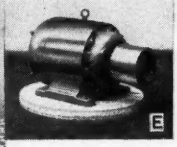


C.—Higgs Motors meet the ever-increasing demand for wider range and more precision in speed

The mechanized foundry, of course, plays an extremely important part in the broader scheme of things we are endeavouring to outline. The magnetic moulding machine exhibited by British Insulated Callender's Cables, Ltd., is designed for forming the sand moulds for ferrous and non-ferrous castings. The basic mechanism is a solenoid housed in the main body of the machine. When the coils are energized the core closes and thus gives the effective squeezing power of the machine. The tangential electro-magnetic separator for feebly magnetic ores shown by the Rapid Magnetting Machine Co., Ltd., typifies another very important contribution to flow line production. Ores may be treated with feed-belt speeds as high as 400 ft per minute.



D.—The moving-coil voltage regulator is applicable to a very wide field in Industry. (*Ferranti*)

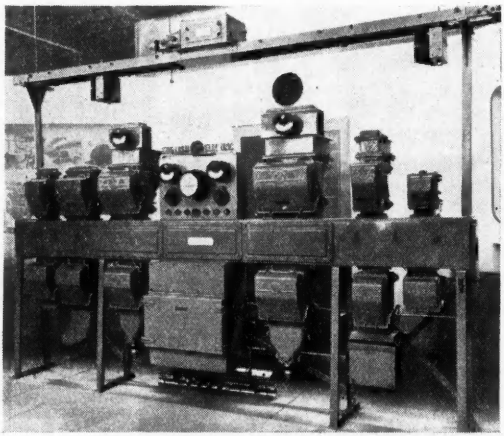


E.—The totally-enclosed motor is demanded for all purposes (*Newman Industries*)

The sodium hydride process for de-scaling metal which is shown in model form by Imperial Chemical Industries, Ltd., is another important development in quantity production, and its electrical interest lies in the electrode method of heating the de-scaling solution. The solution itself forms the heating resistance, and from an incorporated step-down transformer the electrodes are supplied at 14/7 V.

An outstanding example of production

equipment with an incorporated drive is a 300-ton single-action ring-frame all-steel press exhibited by Wilkins & Mitchell, Ltd., used for the production of motor-car panels, sinks, cooker bodies, etc. The main drive is a 35-H.P. slip-ring 1,400-r.p.m. motor, adjustably bracketed high up on the side of the machine, which transmits to the machine flywheel via a 5 to 1 ratio V-belt system. A 3-H.P. motor is also incorporated in the slide and, transmitting via spur reduction gear, allows the slide to be adjusted to suit varying heights of tools. One school of thought favours the totally enclosed motor for all purposes in view of its high reputation from the maintenance aspect in specialized fields. The Newman Industries exhibit gives prominence to this aspect, because all the motors in the industrial range are totally enclosed fan-cooled squirrel-cage machines. The upper limit of 25 H.P. has been fixed because, with the development of the individual drive the demand has become more concentrated within the lower end of the general range.



Flexibility of production equipment lay-out is afforded by overhead bus-bar distribution and fuse-switch boards with clamping of units and connections (*English Electric*)

There is an ever-increasing demand for wider ranges and more precision in speed regulation. In this connection Higgs Motors, Ltd., show a variable-speed commutator motor controlled by an induction regulator. The infinitely-variable speed range of from 700 to 2,100 r.p.m. is shown on a large scale tachometer.

The " Varispeed " equipment of the Electric Construction Co., Ltd., consists of a mercury-arc rectifier in a cabinet, with a normal shunt or compound motor and a control unit which may or may not be incorporated in the cabinet. The main idea is to provide a means of speed variation comparable with Ward-Leonard control where only a.c. supplies are available. Speed variation is actually brought about by varying the armature voltage on the d.c. motor, which is effected by varying the grid dispositions in the regulator in the controller.

The Ferranti 500-kVA 11-kV/400-V moving-coil regulated transformer shown is limited to distribution work, but the moving-coil regulator is applicable to a very wide field in industry. The regulator achieves the control without any contacts or flexible connections. It is driven by a disc motor which is operated by the single three-point mercury switch of an " Astatic " relay.

Apart from wide speed variation developments, special control functions are provided for by equipment like the reversing controllers, protective panels, limit switches, etc., produced by the E.M.B. Co., Ltd., and the time-honoured resistance cannot be dissociated from control equipment of this class. In this latter connection we may mention the expanded metal resistances of the Expanded Metal Co., which have high heat dissipating properties resulting in a considerable reduction in the weight of material required.

As well as flexibility of control, flexibility of production equipment lay-out is an essential feature in many quantity-production schemes. This is afforded by equipment such as that shown by the English Electric Co., Ltd., which consists of an example of overhead bus-bar distribution, together with a combination switch-fuse board. The bus-bar system permits teeing-off for individual drives at any point along the bus-bar line and at any time. The switchboard has a central bus-bar chamber to which various types of switch-fuses are clamp mounted to the chamber. This clamping of the units, together with the clamp connections of the leads to the bus-bars, greatly increases the flexibility.

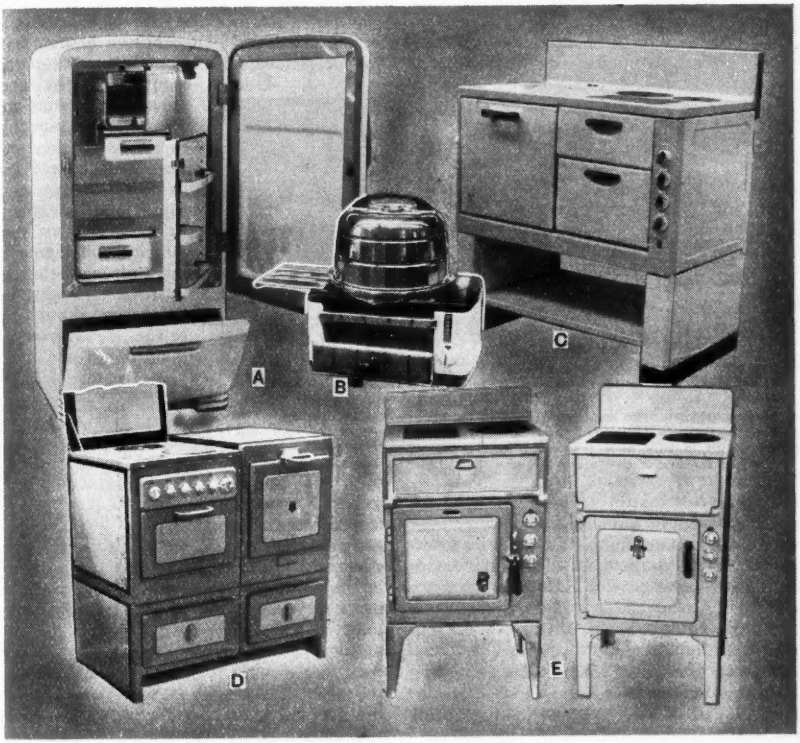
Domestic Appliance Trends

A Study of Exhibits at the B.I.F.

LOOKING back to the last British Industries Fair eight years ago it is surprising to find how much progress has been made in the design of domestic electrical apparatus despite the virtual cessation of development work during the six years of the war. Actually the wartime restrictions have to a certain extent been conducive to the complete scrapping of out-of-date designs and the substitution of entirely new models, though from the practical and economic standpoint this desirable tendency has had to be restricted in order to get into production again quickly.

Consequently, side by side with brand new apparatus, can be seen models which are either identical with pre-war designs or modified only in so far as modernization has been possible without departure from existing production arrangements.

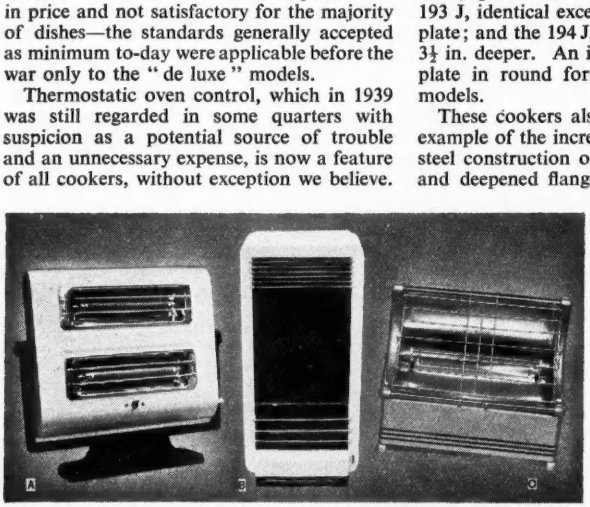
True, even the new apparatus does not on the whole introduce any very spectacular changes in technique or practice, most of the innovations relating to improvement of



A. The small size of the "Presmetic" hermetically sealed condensing unit shown sectionalized on the left gives maximum storage on this 4·44-cu ft "Prestcold" refrigerator. B. A large dome-shaped cover forms a good sized oven on this Moffat "Handichef" breakfast cooker. C. "Creda" horizontal model cooker which will be on the market in a few months' time. D. Appearance of this Moffat horizontal cooker has been improved by the removal of the thermostat from just in front of the splash-plate to the front panel. E. An excellent opportunity to observe the trend of cooker design is provided by these two English Electric models

appearance and performance, easier servicing and maintenance and the supply as standard of features which before the war were considered as "extras." The apparatus in which the greatest progress is most apparent is cookers, but it is unfortunate that the omission from the display of some of the best-known makes, as for example, the G.E.C. and Revo has not permitted a more complete comparison. While no radical new principles are involved — the instantaneous electronic cooker is still prohibitive in price and not satisfactory for the majority of dishes—the standards generally accepted as minimum to-day were applicable before the war only to the "de luxe" models.

Thermostatic oven control, which in 1939 was still regarded in some quarters with suspicion as a potential source of trouble and an unnecessary expense, is now a feature of all cookers, without exception we believe.



A. Reflector type fires are becoming more and more popular. Here is a new Midland Industries "Mindus" model. B. A small amount of radiated heat is provided for in this new "Creda" convector. C. "Solium" finish is a feature of this attractive new Ferranti "Sunera" fire

We think, too, that in a few years' time the same will apply equally to the infinitely-variable hot-plate control, which is a complete answer to the gas "Regulo" device and gives far superior and more accurate control. Already large numbers of cookers are being equipped with it as an extra and the Jackson Electric Stove Co. has been farsighted enough to reverse the procedure and fit "Simmerstats" as standard on its latest range of cookers, a reduction being made if three-heat control is preferred.

To simplify maintenance and servicing virtually all cookers now being made have interchangeable hot-plates and other replaceable parts. Several manufacturers have models available with either one or two hot-plates as required and the new Belling No. 46 with two plates is designed for later conversion if desired to the No. 47 three-plate model simply by changing the hob and inserting an additional switch. Jacksons have carried interchangeability a stage farther by so designing their new range of models that from two sets of components (hobs, ovens, oven elements, doors, etc.) it is possible to construct three different models, the 192 J with 13⅜ in. by 14 in. by 12¾ in. oven, grill-boiler and 8-in. hot-plate; the 193 J, identical except for an additional hot-plate; and the 194 J, with an extra large oven 3½ in. deeper. An improved Backer-Jackson plate in round form is available on these models.

These cookers also provide an interesting example of the increasing use of the pressed-steel construction of the hob, a bracing bar and deepened flanges round the hot-plates ensuring rigidity and preventing distortion. The one-piece pressing employed for the hot-cupboards is recessed to collect spillage and so facilitate cleaning. In contrast to this Simplex still favour a cast hob for their new "Creda" cookers as being more durable.

The controversial question of the fixed *versus* removable oven interiors is continued by the rival systems of these two makes, together with Belling. Simplex favour a three-piece removable interior and Jacksons a seam-welded one-piece fixed construction, while Bellings have a single-piece removable oven. All three are quite easy to clean and in the first two cases plug-in sheathed elements are employed as being simpler for maintenance.

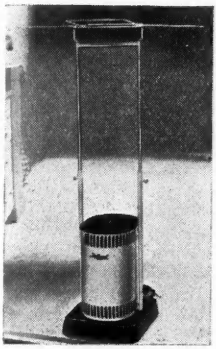
Removable doors have also certain advantages for cleaning purposes, as has also the complete dismantling of the hob equipment now common practice. Drop-down doors providing a convenient resting place for the roasting-pan and obviating the necessity for left- and right-handed doors, have been employed only by Moffats for many years. Now they are appearing on a number of the newer models, including the "Creda"

horizontal unit still in the "prototype" stage. The inner glass doors which have been an exclusive feature of the Belling No. 63 model are now to be found in a new two-plate design and as an extra in the company's new standard models.

A very worth-while innovation to be found not only in the large Moffat but also in the new "Creda" models is the incorporation of a plate-warming drawer with its own separate heating element. The normal hot-cupboard is seldom really large enough to hold all the plates and dishes required, while the drawer relying on the heat of the oven to be found on several of the latest types, though of considerable convenience, is not of much value if the oven is not in use.

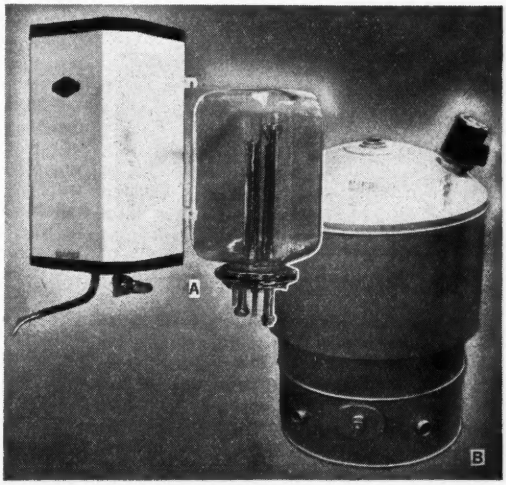
The added demand for built-in equipment, especially for temporary and municipal housing schemes, has had a very noticeable effect on design. In the "Creda" cookers, for instance, the fuses have been transferred from the side to beneath the hob, while the ventilation outlet has been carried up through the hob just in front of the splash plate.

The urgency of the National Housing Drive has also made its impression felt in certain respects, such as in the use of aluminium instead of steel in some instances and in the concentration on one standard colour rather than the offering of alternatives. Light mottled grey or cream are normally the only finishes available for the home market, though overseas buyers are often in the favoured position of being able to obtain alternative colours which will not be offered in this country at present.



Hotpoint clothes airer

It is perhaps in the matter of general appearance that development is most noticeable. The new "streamlined" effect which is the *sine qua non* of the modern cooker is not, however, a matter of "eye-appeal" only. Easier cleaning and larger oven capacity, as well as the incorporation of warming cupboards at the bottom are all resulting benefits. Particularly noteworthy is the careful attention now being paid to minor details such as the design of the oven and grill compartment door handles, the neatness and colour of which make a big difference in producing a pleasing ensemble. Incidentally another interesting break-away from convention is the method of placing the grill compartment handle on the right in line with the oven door instead of in the centre adopted by the Jackson Electric Stove Co.

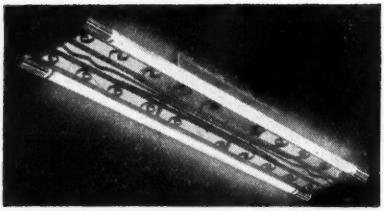


A. A rectangular design has been adopted for this Hotric 3-kW thermal storage heater, a special feature of which is the "Pyrex" inner container seen on the right. B. The Berry "Fuelec" hot water storage cylinder ensures the efficient operation of an immersion heater used in conjunction with a solid-fuel boiler

Perhaps no better example of the trend of progress has been provided than by the comparison on the English Electric stand of its pre-war standard cooker with its modern counterpart seen side by side. Almost every single component has been redesigned—the splash plate is higher; both oven and hot-cupboard doors are improved, the former having a new concealed vent incorporated; and the legs and handles are of neater and more modern appearance. The 4-kW ultra

quick hot-plate introduced last year will be available on all models as soon as possible.

Because of the preoccupation with "standard" cookers for the N.H.D., manufacturers have not drawn much attention to horizontal models. Simplex exhibit in the



Wrought iron is used to good effect in this McGeoch fluorescent lighting fitting

prototype stage a horizontal version of their new standard model, while Moffats, besides showing an improved "31SG" unit with the thermostat removed from the top to the front panel, have been showing a Canadian model, a slight variation of which it is planned to make at Blackburn. Special features of this are a time-switch control available for operating one of the two ovens, a hot-plate or a socket outlet; and a use of colours instead of wording on the switches.

Apart from the post-war "Baby Belling" models brought out last year, we noticed only one type of small cooker, the Moffat "Handichef." A unique feature of this is the provision of a large dome-shaped cover which placed on top of the 1,750-W radiant-type hot-plate forms a good-sized oven. An extension plate on the side gives extra working space. At the other extreme, among the heavy-duty equipment is the new "Creda" restaurant cooker, with small and large ovens and large capacity grill compartment and hot-cupboards, designed to cater economically for from 10 to 80 persons.

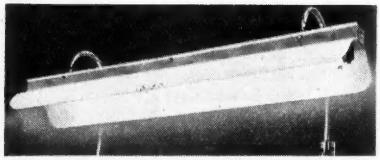
Not many toasters have been shown, but we were interested to see that Fisher (Oldham) have extended their activities to include a two-slice aluminium model with automatic reversing arrangements.

Space Heaters

The two most noticeable things about heating equipment are the increasing acknowledgment of the advantages of convectors for certain situations, and the preference in radiators for the rod type element used in conjunction with reflectors; fire-bar units appear to be largely reserved for situations where the focusing effect of reflectors, close to furniture, curtains, etc., might be dangerous.

While most of the convectors are of the straightforward type providing for cold air to be admitted at the bottom warmed and discharged at the top, the new "Creda" unit is arranged so that its sheathed element gives out a small amount of radiant heat at the bottom to meet the all-too-prevalent complaint of cold feet. A higher proportion of radiant heat is provided by British Emulsifiers' "Radovection" convection radiators, with a series of baffles incorporated in the reflector, and by the glass-fronted "Conflector," available in both portable and inset types from Eralite, whose new "Chaudaire" is a modern variant of the fan heater.

With the increasing preference for the reflector fire, due mainly to the greater apparent heat emitted, much more attention has been given to the design of the reflectors with the object of providing a wider heat distribution. Typical examples of this are



Neat fluorescent lighting fitting (Peglers) specially suitable for bathroom use

the very attractive unit made by the English Electric Co., which has also a new range of 2-kW inset reflector units of both square and rounded designs. The prevalent shortage of sheet steel has been overcome in the Midland Industries "Mindus" fires by the use of aluminium throughout. These units are made both with portable adjustable reflectors and in wall mounting types.

Greater attention to the design of guards not only increases safety but also improves appearance. The guards of the new Ferranti "Sunera" models, which are available in both chromium and "Solium" are particularly good and it is impossible for a child to touch the elements. Even greater safety precautions are taken in the same company's high-temperature low-level radiant heaters for school use: loaded at 460 W, they are operated on 110–125 V, being normally wired in pairs. For decorative effect the grilles on some of the Bratt Colbran reflector units take some beating, while exceptionally

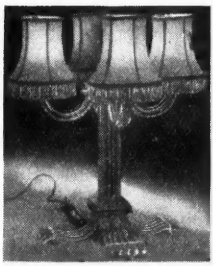
strong guards of imaginative design are a feature of the Woodmet 7-in. and 9-in. bowl fires. Despite being superseded to some extent by small units of the parabolic reflector type, bowl fires are still very much in public demand, judging by the number on show.

Though colour lighting has largely taken its place, there is still a substantial demand for imitation coal and log effects. With the particular object of appealing to American and Canadian buyers Berry's Electric have introduced a special model called the 40/60 (the latitudes of the area in question). Either coal or log effects are available and for houses where central heating makes electric heating superfluous and the apparatus is required only for the sake of appearance the 1½-kW elements are omitted. A new large 3-kW log fire is also available.

Radiant panel heaters of the "Medrae" type produced by Richard Crittall have made a certain amount of progress, though mainly for commercial use, domestic applications being mainly confined to portable types which can be utilized also as towel airers, etc. Hotpoint have a new portable unit and Simplex a polished aluminium towel rail of exceptionally pleasing appearance. A drying cabinet is another new Fisher product.

Water Heating Equipment

On the water heating side the shortage of solid fuel has emphasized the convenience of electric heating used in conjunction with solid-fuel boilers. Apart from simple immersion heaters Aidas offer two alternatives, the "C.E.L." coal-electric "Sadia" water heater and the improved "Circoil" unit which, used in conjunction with a thermal storage electric water heater, utilizes hot gases normally wasted in the chimneys. For special use in cases where the solid-fuel boiler provides the basic hot water service Berry's have produced the "Fuelec" 30-gal. hot water storage cylinder. Efficiently lagged and with an immersion heater as an integral part, this unit overcomes the difficulty of securing effective lagging of the normal hot water tank and ensures economical operation and minimum heat loss whichever method of heating is in use.



Strip "Perspex" besides saving metal gives a modern touch to this Berry table lamp

Though many new models are shown none of the thermal-storage type heaters appears to incorporate any particularly new features. The highly-efficient dual purpose unit made by most manufacturers for installing under the draining-board to give a small amount of water immediately and its full 30-gal. capacity in a short time, is now well known. Slightly different among the standard types of units is a new 3-gal. Hotric unit of rectangular design. Like all this company's models the inner container is of "Pyrex" glass, a feature of some importance in the matter of hygiene.

The generally accepted practice of employing the long immersion-type element inserted in the base of the thermal-storage heater is challenged by an interesting demonstration on the Simplex stand. Four thermo-couples inserted in a 1½-gal. unit fitted with a tubular immersion element of the type used in this company's kettles show both the uniform temperature gradient throughout the container and also the quick recovery rate. Originally this type of element was introduced to overcome the scale difficulties encountered in hard water districts.

Though many new modern designs in kettles are beginning to make their appearance, the immediate need for production is causing the largest manufacturers to continue with the well-tried pre-war models, which in any case are still attractive. Main features of the new models are greater streamlining, more comfortable handles and avoidance of risk of scalding by steam. The only really spectacular development is the use in the Eralite "Chaudeau" kettle of an element made up of 45 ft of "Pyrotenax" mineral insulated cable giving an extra-large heat dissipating surface.

Laundry Appliances

The cabinet type construction has now been adopted as standard for washing machines, development of which is largely in appearance, more convenient controls, quietness of operation, and increased wringer safety. While the incorporation of pumps is becoming fairly common practice, only a few models, made by some of the smaller manufacturers, have electric heating. Wringing *versus* spin drying is a controversy which has yet to be settled. The latter method, though so far less favoured, has certain

advantages, particularly in connection with automatic operation, and is essential in a double-purpose combined clothes and dish washing machine such as the Hurley.

Lamps for illuminating the working surface are being found a good selling point for irons by both Premier in their "Eight-o-Eight" model and Simplex in their "Creda Halo" unit, which in common with some other makes is now being made with a snap-action thermostat to avoid radio interference. A double-ended model is a Telsen innovation. Other developments are confined principally to improved appearance and more comfortable grip. To-day it is difficult to find an iron which is not streamlined and thermostatically controlled. Production difficulties are no doubt restricting the making of table ironers which must surely have a promising future and the only model on view is a Hotpoint product.

Refrigerators

Although only two makes of refrigerator are shown these provide the opportunity of comparing the relative advantages of the compressor ("Prestcold") and absorption (Electrolux) types. Thinking back to the pre-war models one cannot help being struck by the compactness of the newer compressor type machines. Thanks to the use of the "Presmetic" hermetically sealed condensing unit the smallest "Prestcold" model for instance, though having overall dimensions of only 36 in. by 21⅜ in. by 23¾ in. has a net storage capacity of 3·1 cu ft and a shelf area, including the base of the storage compartment of 6 sq ft. Features of the 4·44 cu ft model are the provision of two ice trays, drip tray, "Crispator" compartment recessed in the door, meat tray and "Prestador" extra storage. Intermediate between the 1½ and 3·8 cu ft models Electrolux have just brought out a new 3 cu ft refrigerator.

Lighting Fittings

Practically all the lighting exhibits have been housed at Olympia but it has been possible nevertheless to obtain from the few items shown at Castle Bromwich an impression of the extent of the great strides made by fluorescent lighting. Manufacturers still have a long way to go in the design of the special types of fittings required to meet the requirements of this new form of illumination but they are making a real endeavour to produce something attractive. The length of the tubes now available does not help in this respect but the promised shorter units should simplify matters. At all events provision is now almost universally made for embodying the choke as an integral part of the unit, and imaginative use is being made of the use of materials other than sheet-metal, such as "Perspex" and wrought iron. "Perspex" besides overcoming the difficulty of obtaining metal supplies is also being employed extensively in sheet and strip form for decorative fittings for tungsten lamps.

Vacuum Cleaners

Most of the vacuum cleaners are to be found at Earls Court but, in addition to the new Z.30 Electrolux model there is the new Midland Industries "Milvac" unit which though weighing only 5½ lb can be used for carpets as well as for curtains, etc. Its light weight is due to the use of aluminium and magnesium alloy. The ⅛-HP, 10,000-r.p.m. motor with a two-stage turbine type fan provides a throughput of 50 cu ft per minute. The usual nozzles for carpets, etc., are supplied while polished aluminium and bright coloured enamels provide an attractive finish. At present, like so many other appliances, the cleaners is being made for export only.

Radio-Wave Velocities

THREE papers on the measurement of radio-wave velocities were presented by members of the Telecommunications Research Department of the Ministry of Supply to the I.E.E. Radio Section on May 7th. One by Dr. R. A. Smith, Dr. E. Franklin and Mr. F. B. Whiting dealt with short waves, using radar technique, as influenced by the effect of the earth's surface and the atmosphere. The authors showed the difficulty of deducing results from the velocity of light owing to the higher permittivity of water vapour at radio frequencies than at optical frequencies. They concluded that at present the theoretical value of the velocity of propagation appears more reliable than the measured value.

An account of experiments made during the war for determining the velocity of 3,000-metre waves over land at frequencies near 100 kc/s formed the subject of a paper by Mr. E. B. Mendoza; the final average was shown to be lower by 1·4 parts in 1,000 than the velocity of short waves through air. Dr. F. E. Jones's paper was the first of three relating to propagation of centimetre waves as a function of height above the earth and dealt with ground level measurements over a sea path. The method described is based on the "Oboe" system of blind-bombing and experiments gave a final result of 186,217 ± 16 miles per sec.

Wiring Accessories

Improvements in Design but Few Novelties

AFTER a lapse of seven years home and overseas visitors to the Fair have had eleven week-days in which to compare the exhibits of a large number of competing manufacturers. The very wide ranges of products displayed in the past have been grouped with the intention of facilitating comparison and to enable buyers to re-establish direct contact with former suppliers.

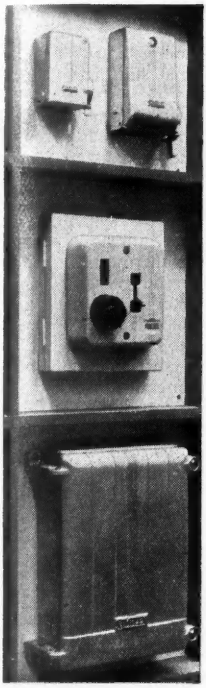


Fig. 1.—Simplex switchfuses, cooker control unit (centre) and distribution box (below)

Unhappily neither object has been easy to achieve for there were not nearly so many house-wiring accessories on view as one had become accustomed to expect. The absence of prominent makers who exhibited regularly for years is noticeable while those represented at this first post-war Fair have concentrated on refinement of detail and modernization of style rather than on the production of novelties and few have deemed it wise to depart from established practice.

For example, the switchfuses of the Simplex Electric Co., Ltd., are "streamlined" for less projection while the latest cooker control unit (fig. 1, centre) appears to be flat by comparison with the older cast box. It contains a 60-A switch with a long-travel handle projecting through the front cover, instead of a handle at the side; it is spring loaded and cam operated to produce a double break, the initial "micro gap" being followed by larger separation.

Distribution boxes have been improved in form, and their lids are now secured by coin-slotted screws instead of wing nuts. The variety of Simplex-Lundberg switches includes the rubber buffered "Silent" pattern for hospitals, motor starting and reversing tumbler switches of from 5A to three-pole 25A sizes with a centre-off position and 5- and 10-A twin-knob types with spring release of one knob.

Apart from its heavier industrial ranges, Walsall Conduits, Ltd., is producing a full range of domestic wiring accessories, including a 3-kW shuttered outlet socket (fig. 2) with a fused plug and flat pins made to B.S. Specification.

A comprehensive range of conduit fittings and switch assemblies (fig. 3) has also been introduced for industrial use, as distinct from mining, in situations made hazardous by fumes, liquids and dusts; most of the range is "Buxton certified" as flameproof and approved for connection to mineral-insulated copper-sheathed cables.

In addition to "Clix" products and "Genacco" wiring accessories, the "Surrey" micro-break switch is shown by the General Accessories Co., Ltd., in 2, 3 and 4 ganged assemblies while the shuttered outlet sockets for 5 and 15A have flat pin plugs containing a fuse. The latter has no fixing clips so that fuse wire cannot be used in place of the cartridge, which simply bridges a contact-cradle; it is kept in position by spring pressure applied by the cap, which is secured by captive screws. Black and ivory finishes only are offered to avoid colour-matching difficulties.

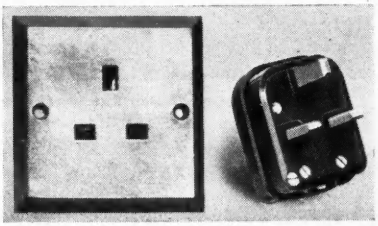


Fig. 2.—Flat pin Walsall 3-kW fused plug and socket outlet

An unusually arranged switch of Hi-Craft Electrical Products, Ltd., has a vertically sliding dolly which is spring loaded horizontally on either side (fig. 4). Tests at the N.P.L. at from 10 to 100A in ten increasing steps of 10A each showed satisfactory operation and serviceable condition at the end of each test. Beside "Catalin" switch plates of handsome appearance there is the "Pep" range of domestic accessories in numerous bright colours.

The unusual design of Kirk Electrical Industries, Ltd., has a dolly action which moves twin rods vertically, so lifting a cross piece off the contact terminals; the name "Rolac" comes from the rolling action of the leafspring cross piece, which has curved extremities.

A useful table lamp switch of Fitz-Gibbon & Murray, Ltd., is of the flat push-bar type so being less liable to roll off a table than a "torpedo" shape; pear switches and bell pushes of real ivory are attractive and bell pushes of turned casein in many colours are also displayed.

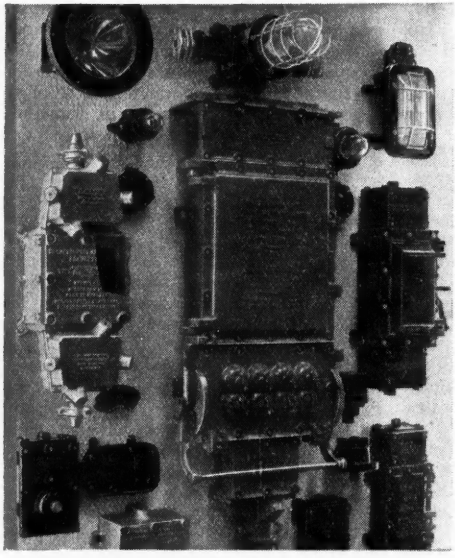


Fig. 3.—Range of Walsall flameproof industrial accessories

Switches of the 5-A micro-gap class are in the range of Victor H. Iddon, Ltd., as well as a transformer buzzer combination designed for economy in circuit wiring. A novelty of Clang, Ltd., is a lamp dimmer which does not waste energy in resistance and incorporates a fuse which is replaceable by removing the cover plate; it is made up of a series of impedance coils with closed iron cores and steel tappings for contact making when the knob is rotated.

Scarcity of heavier switchgear and control apparatus was matched by the relative absence of decorative lighting fittings, although fluorescent tubes were displayed on a number of stands complete with associated control gear, thermal starting switches and chokes.

In addition to time switches for controlling street lamps and such-like needs, Horstmanns show an auto-timer for cookers which can be pre-set for maintaining oven temperature and automatically switching-off unattended cookers; it is synchronous-motor driven, so does not require to be wound by hand. The thermostatic regulator made by the Rheostatic Co., Ltd., for cooker ovens has not changed; a pilot lamp is inset in the control knob, which differs in form according to the individual preference of cooker makers.

On this stand there is also displayed the millionth thermostat made by the Rheostatic Co. for domestic water heaters. "Certostat" thermostats incorporating Burgess micro-switches are offered by Cyril Kieft & Co., Ltd., and are utilized in their convector room heaters. Thermostats made by Electro Methods, Ltd., include types for clothes irons and bed warmers as well larger sizes for room heaters.

Conduit is not much in evidence although the wide range of conduit accessories now offered by Metway Electrical Industries, Ltd., in association with Barries Agencies' conduit and switchgear, include improved fittings, aluminium terminal boxes and flexible metal tubing with brass adaptors for connection to conduit.

In contrast overhead busbar trunking for the distribution of power in factories and industrial premises generally were shown on several stands, such as those of the English Electric Co., Ltd., and the Power Centre Co., Ltd., while the system of British Insulated Callender's Cables, Ltd.,

does not need trunking; it makes use of a fused teebox for tapping cables attached to the walls without cutting the conductors.

A new variant for wiring commercial premises, hospitals, hotels and similar buildings has been introduced by Channel Conduits, Ltd., one of the Richard Crittall group. It is intended to reduce installation costs and weight and to facilitate subsequent alterations and extensions. Erection can be undertaken rapidly by less skilled men, since the system consists of rectangular conduit made in 12-ft lengths of sheet steel in five sectional sizes with a complete range of accessories. The channels are covered with "capping" which is sprung on to the channel or accessory by hand, being corrugated in a particular way to make a remarkably tight and rigid assembly. The capping is nevertheless easily removable for subsequent system modification, while bolts and screws are not needed. More cables can be accommodated in these channels than in tubular conduit occupying the same wall surface space and are much more readily accessible. The black matt finish of the channels is rust preventing and does not need to be removed for earthing purposes; it is a high temperature process of metallic impregnation and the finished surface will take paint of any colour.

Control gear of a smaller category for motor cars was to be seen on two stands. Products of Trico-Folberth, Ltd., include an electric heating frame which functions as an external de-froster and internal de-mister of the car windscreen. There is also a new motor-driven wiper for curved glass windscreens which may shortly be fitted to cars. The press-button "Lift-o-Matic" system of opening and closing vehicle windows is vacuum operated, but controlled by electrical actuation of a valve; "inching" is effected by tapping the button and a master button enables the driver to close all windows simultaneously.

Among electrical accessories for cars and motor cycles on the stand of the Lucas group is a "Freelite," complete with a windmill on wooden mast. It is an adaptation of the 12-V car dynamo to the lighting of bungalows and pavilions, utilizing two 6-V 130-Ah batteries to supply six small lamps.

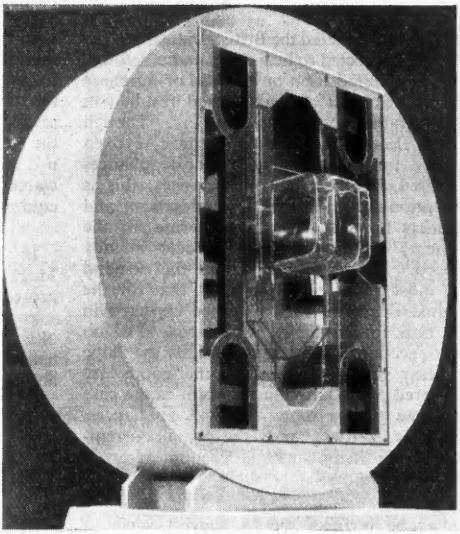


Fig. 4.—Demonstration model of "Hi-Craft" tumbler switch

The dynamo is mounted at the top of the mast and is gear driven by a wind propeller with twin blades of 6 ft overall length, the mast being about 40 ft high.

British Association Meeting

FOR the first time since the war the British Association for the Advancement of Science is arranging a full-scale meeting. It is to be held at Dundee from August 27th to September 3rd under the presidency of Sir Henry Dale, O.M. A provincial programme which the Association has issued shows that the meeting will be on similar lines to the pre-war gatherings. There will be thirteen sections covering the usual branches. The president of Section A—Mathematics and Physics is Sir Edward Appleton, G.B.E., whose address will deal with "Earth, Stars and Radio," and Sir William Halcrow is president of Section G.—Engineering, which is to meet in the Engineering Department of University College. His address will be on "Progress in Modern Engineering."

Members and associates wishing to attend the meeting are asked to notify the Secretary, Burlington House, London, W.1, as soon as possible. A number of excursions and works visits are being arranged.

Views on the News

Reflections on Current Topics

WHEN I visited the British Industries Fair I expected to hear from manufacturers that the reimposition or increase of purchase tax on electrical appliances had resulted in considerable cancellation of orders. Though a few electricity undertakings have revoked orders for cookers and other appliances required for their housing schemes, this is exceptional, and most wholesalers and retailers have no wish, at any rate for the present, to interfere with orders already placed. Their attitude is that the demand for most apparatus is so great that for the limited deliveries which can be expected in the near future the additional cost is of no great account. And there is also the hope in their minds that before the goods are delivered Mr. Dalton may relent in the case of some of the more essential appliances, such as kettles, and the small-current-consuming items such as vacuum cleaners and refrigerators.

* * *

Far be it from me to suggest ways of evading the Government's plans for restricting the use of electricity by means of the imposition of purchase tax on appliances, but it does seem that there are quite a number of loopholes of which the unscrupulous will avail themselves. For instance, there appears nothing in the regulations to prevent electric kettle bodies and elements being sold separately without payment of purchase tax unless the phrase " the position of the articles is not affected unless they are supplied with chargeable appliances as standard accessories " can be said to apply or unless immersion type elements (the kind used in most kettles these days) are in this case regarded as " immersion heaters with loading not exceeding 3 kW." Apropos this last classification it appears that it is quite in order to supply immersion heaters without charging purchase tax so long as the loading is above 3 kW, no matter how little above; 3¼ kW would be most suitable for domestic use, necessitating no alteration in design.

Many other possible ways of tax evasion might be indicated but surely the whole question of the imposition of the tax calls for reconsideration. There may be a case for discouraging the sales of fires though with the two millions produced for the home market last year and the shops still full of them it is doubtful whether the tax will have the desired effect. But there can be little justification for a tax on an electric kettle, the lack of which almost inevitably means the use of some less efficient method of boiling water. The same may be said of cooking equipment.

* * *

In the Spring number of the " Nesco Magazine " I find this story:—Testing protective apparatus in a cabinet situated in a corner of a field some years ago, some N.E.S.C.O. engineers found themselves hemmed in by young cattle. They kept the animals at arm's length by using the *Electrical Review's*, " Suggestions for Dealing with Electric Shock " which was mounted on two wooden rollers and when they had finished the test, fought their way out with fists and feet. I am told that this weapon of defence is now temporarily unavailable and the wartime substitute would be quite inadequate for warding off inquisitive live-stock.

* * *

In urging a separate national agreement covering wages and conditions in the radio industry at last week's E.T.U. Conference, Mr. E. V. Hurran, of Ilford, said that there was a vast difference between the work of electricians and that of electronic workers. " By the application of electronics, the upper atmosphere over London would be made to fluoresce and glow to such an extent that street lighting would be done away with. Before long there would be a few artificial moons floating round the earth, equipped with radio installations and power that would last for years, and would send back information from outer space." This might justly be called " moonshine," I think.

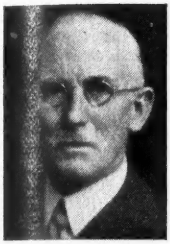
* * *

It was stated by Mr. F. J. Erroll, M.P., in last week's *Electrical Review* that Mr. Glenvil Hall said in the House of Commons (*apropos* the purchase tax) : " Quite obviously, electric cooking is much cleaner and it is a modern method of heating and lighting as well." The use of cookers for heating and lighting should not be encouraged at the present time.—**REFLECTOR.**

PERSONAL and SOCIAL

News of Men and Women of the Industry

On the joint recommendation of the presidents of the Royal Society and the Institution of Civil Engineers, the Council of the Institution of Civil Engineers has awarded the James Alfred Ewing Medal for 1946 to **Sir Clifford Paterson,** O.B.E., D.Sc., F.R.S., for specially meritorious contributions to the science of engineering in the field of research. Sir Clifford Paterson is in charge of the research laboratory of the General Electric Co., Ltd., Wembley, Middlesex. His contributions to the science of engineering in the field of research have extended over forty-five years. His work has been particularly outstanding in the development of new sources of illumination, in the study of their use and in their precision measurement. This work was carried out at the National Physical Laboratory until 1919, and later continued after he had joined the G.E.C. More recently he has co-ordinated the work of numerous teams in connection with outstanding developments in the use of high radio frequencies. He was awarded the Faraday Medal in 1945 and received his knighthood in the Birthday Honours last year.



Sir Clifford Paterson

Lt. Col. J. Rankin, director and general manager, North Wales Power Co., has been elected a Companion of the Institution of Electrical Engineers by the Council of the Institution. He was also recently appointed by the Central Electricity Board as one of the Board's representatives on the Council of the British Electrical Development Association.

Mr. A. W. Barham is resigning his position as chief engineer and general manager of the Watford electricity undertaking on July 31st, after thirty-five years' service with the Corporation. Mr. Barham has intimated his willingness to continue to assist the undertaking for the time being, the desirability of which the Electricity Committee is considering together with the question of the appointment of a successor.

In the House of Commons on Tuesday Mr. Shinwell announced that **Lord Citrine** is to become chairman of a new organizing committee for the electricity industry to be set up as an interim measure. Mr. Shinwell said that in the case of electricity it was particularly important to shorten the interim period as one of the most important tasks of supply authorities would be to press on with the provision of new generating plant. The other members of the committee would be **Sir Johnstone Wright,** general manager, Central Electricity Board; **Mr. J. Hacking,** chief engineer, C.E.B.; **Lt.-Col. E. H. E. Woodward,** North-Eastern Electric Supply Co., Ltd.; **Mr. J. Eccles,** city electrical engineer, Liverpool; and **Mr. E. W. Bussey,** general secretary, Electrical Trades Union. The committee would have the advice and help of the Electricity Commissioners. **Mr. H. Hobson** had resigned the chairmanship of the C.E.B. and Sir Johnstone Wright would succeed him for the interim period until the Board was taken over by the new Authority. Lord Citrine would be succeeded as member of the National Coal Board by **Sir Joseph Hallsworth.**

Mr. G. W. Alexander, B.Sc., A.M.I.E.E., A.M.I.Min.E., has been placed in charge of the Mining Department of the Metropolitan-Vickers Electrical Co., Ltd., in succession to Mr. H. Watson-Jones, whose appointment as chief electrical and mechanical engineer to the North-Western Division of the National Coal Board was announced some time ago. Mr. Alexander obtained an engineering degree of London University as a student at Brighton Technical College. During his engineering course he spent two periods as a vacation apprentice at Metropolitan-Vickers, and in 1931 he returned to Trafford Park as a college apprentice. Two years later he joined the engineering side of the Mining Department. During the war Mr.

Mr. G. W. Alexander

Mr. E. Loynes

Alexander was seconded to the company's Special Contracts Department, where he was chiefly concerned with the supply of control equipment for guns; recently he visited Germany as a member of a British Intelligence Objective Sub-Committee to investigate the use of Koepe winders.

Mr. E. Loynes, A.M.I.E.E., of the Mining Department of Metropolitan-Vickers, has recently been appointed Divisional Electrical Engineer to the North-Western Division of the National Coal Board. Mr. Loynes gained the associateship of the Manchester College of

Technology, and served his apprenticeship at the Metropolitan-Vickers works. In 1928 he joined the Mining Department of the company, being placed in charge of the drawing office in 1929, and later moving to the engineering side of the Department; he was concerned with the design of some large electric winders for Russian coal, iron and gold mines, this entailing visits to Germany in 1932 and to Russia in 1935. From 1941 to 1944 Mr. Loynes was manager of one of the Metrovick " dispersed premises " at Timperley where radar equipment was manufactured for Government contracts. Soon after his return to the Mining Department, he again visited Germany, this time as a member of the skip and cage winding investigation team organized by the Ministry of Fuel and Power. Mr. Loynes has read technical papers before various institutions.

Mr. J. Walsh has resigned as chairman of Blackburn branch of the Electrical Contractors' Association, and has been succeeded by **Mr. T. Blackshaw. Mr. J. Heys,** hon. secretary for twenty-one years, has also retired, and has been elected vice-chairman, **Mr. R. E. Dixon** being appointed secretary.

Mr. A. Miller and **Mr. D. J. Robarts** have retired from the board of Broadcast Relay Service, Ltd. **Mr. J. S. Wills,** managing director of the British Electric Traction Co., Ltd., and **Mr. R. P. Beddow,** chairman and managing director of the Antrim Electricity Supply Co., Ltd., have joined the board and Mr. Wills has been appointed chairman and managing director.

The Earl of Rothes and **Mr. A. Miller** have been appointed to the board of the British Electric Traction Co., Ltd.

Mr. W. Payne-Clark has resigned his position with the Automatic Coil Winder and Electrical Equipment Co., Ltd., to join Taylor Electrical Instruments, Ltd., of Slough, Bucks, as special sales representative. For the present he is confining his activities to the Greater London area.

Mr. E. J. Batchelor, who joined the Brush organization last year, has been appointed assistant managing director of Brush Coachwork, Ltd.

Mr. H. L. Wadeson, A.M.I.E.E., change-over engineer with the Finchley Corporation Electricity Department, has been appointed mains superintendent with the Hazel Grove and Bramhall U.D.C. Electricity Department.

Mr. A. Feiner, Graduate I.E.E., has relinquished his post with the Hydraulic Section of the English Electric Co., Ltd., Stafford, and is joining the staff of the Harland Engineering Co., Ltd., Alloa, in the newly formed Hydro-Electric Contracts Execution and Tendering Department.

Liverpool Corporation Electric Power and Lighting Committee has made the following staff changes: **Mr. J. Owen,** assistant maintenance engineer (electrical), Clarence Dock power station, becomes assistant electrical engineer; **Mr. G. Gorst,** junior assistant maintenance engineer, Clarence Dock power station, becomes assistant maintenance engineer (electrical); and **Mr. N. D. B. Hyde,** senior inspector of installations, becomes assistant meter and test superintendent.

Mr. T. Settle, Ph.D., M.I.E.E., manager of the Industrial Heating & Carbon Departments of the G.E.C. and a well-known figure in the electrical industry, retired on March 31st, after completing nearly fifty years in the industry, the last thirty-nine of which were with the G.E.C. He has been a member of the Institution of Electrical Engineers since 1912. Dr. Settle received his early training at the Universities of Vienna and Heidelberg, and after gaining considerable technical experience on the Continent, came to England in 1904 and joined the G.E.C. in 1908 as manager of Arc Lamp and Carbon Department. In this capacity he was responsible for much of the development which occurred at that time in the lighting of streets and works by arc lamps and in the early development of carbons for the cinematograph industry. Immediately following the first world war he took charge of the Heating Department with responsibility for both industrial and domestic equipment. When, in 1926, it was split into two separate departments, Dr. Settle retained the Industrial Heating Department. During the 1939-1945 war, he was closely connected with the Arc Lamp Carbon (War Emergency) Pool which was instrumental in assuring the supplies of lighting carbons for military and civil purposes. Dr. Settle has served on several B.E.A.M.A. sections and groups. He instituted the formation of the B.E.A.M.A. group dealing with electric resistance furnaces, acting as its chairman for twelve years after its formation. He is a director of United Lamp Black Works, Ltd., an appointment which he still holds.

Dr. T. Settle

Mr. J. J. Ratcliffe, son of Mr. J. Ratcliffe, engineer and manager of the Bredbury and Romiley Urban District Council's electricity undertaking, has been appointed an assistant mains engineer in the Ashton-under-Lyne Corporation Electricity Department.

In connection with the repair and servicing of radio receiving sets by Hammersmith Electricity Department, **Mr. I. H. Smith,** meter repairer and tester, has been appointed to the temporary position of testing assistant (radio).

The Nottingham Centre of the East Midland Area of the Illuminating Engineering Society

held its annual meeting in Nottingham on May 9th, when **Mr. J. Charity** was appointed chairman in succession to **Mr. R. G. Payne.**

On May 5th **Mr. L. Gamage,** vice-chairman and joint managing director of the General Electric Co., Ltd., celebrated his sixtieth birthday. To mark the occasion, the senior staff of the home organization of the company presented him with a silver tea service with an engraved tray, and from the senior staff of the overseas organization he received an engraved silver cigarette box with two ash trays to match. Mr. Gamage joined the G.E.C. twenty-eight years ago and was elected to the board in 1925 when he assumed responsibility for the company's export business.

Mr. F. Morgan, A.M.I.E.E., A.M.Inst.C.E., power sales engineer at Stalybridge, has been appointed deputy electrical engineer and manager with the Chester City electricity undertaking.

Mr. W. M. Gore is leaving the South Lancashire Transport Co. to join the Southport Electricity Department as charge engineer.

The Sydney County Council, New South Wales, has appointed one of its engineers, **Mr. J. Magee,** to act as its engineer representative in England to deal with matters relating to the delivery of plant and equipment urgently needed for the Pyrmont "B" power station. Mr. Magee expects to arrive in London at the end of May, and correspondence should be addressed to him c/o Preece, Cardew & Rider, 8, Queen Anne's Gate, Westminster, S.W.1.

On Tuesday last week, the Central London Electricity Music Society (Central London Electricity, Ltd.), gave an orchestral and choral concert at the Kingsway Hall, W.C.2, in aid of the British Empire Nurses' War Memorial Fund. With the excellent concert given by this Society in December last still fresh in our memory, we looked forward to a further enjoyable evening and we were not disappointed. In Schubert's "Unfinished" Symphony the orchestra, under Mr. John Steele, enhanced its reputation. The main choral work of the evening was Stanford's "The Revenge" set to Tennyson's poem, and both the choir and orchestra gave a fine rendering. The choir reached its greatest heights, however, in Parry's "Blest Pair of Sirens," which was beautifully sung. The programme concluded with two unison hymns "The Airman's Hymn," the words for which were written by the Earl of Lytton (chairman of Central London Electricity, Ltd.), and the music composed by Vaughan Williams, and Parry's "Jerusalem." The well-filled hall indicated that the Fund will receive substantial benefit.

The Lancashire Electric Power Co.'s Amateur Dramatic Society successfully presented "Quiet Week-end," the comedy in three acts by Esther McCracken, to three packed houses at the Queen's Hall, Manchester, on April 23rd, 24th and 25th. Some members of the cast were making their debut, but under the skilful guidance of the producer, Mr. I. L. Thomas, they acquitted themselves remarkably well. When the final curtain was lowered on the last night Mr. M. H. Adams (chief engineer and manager), who is president of the Society, congratulated the cast, and Mr. S. M. Rix (secretary and assistant manager) said he was proud to be chairman of the Society. The Ormskirk Branch of the Dramatic Society recently presented "Outward Bound," by Sutton Vane, and on May 9th the Chorley Branch are putting on three one-act plays.

Obituary

Mr. A. Albrecht.—It is with regret that we have to record the death of Mr. A. Albrecht, Director of the Electrical Wholesalers' Federation which occurred on May 9th.

Mr. W. H. Morton.—We learn with regret of the death, on May 10th, of Mr. William H. Morton, director and secretary of Bruce Peebles & Co. Ltd. He was in his sixty-sixth year.

Mr. J. G. Laird, assistant area engineer to the Clyde Valley Electrical Power Co. in Coatbridge, died recently.

Indian Training Scheme

MR. M. S. THACKER, B.Sc. (Eng.), M.I.E.E., tells us that he has left the Calcutta Electric Supply Corporation to become head of the new Power Engineering Department at the Indian Institute of Science, Bangalore, which he is to organize.

To consider the training of engineers to meet the power engineer requirements that would arise in India's projected electric power development, an expert committee was formed in 1945, from the foremost scientists and engineers in India including the electrical commissioner of the Government of India. A scheme was formulated for the establishment of an institution for such training, for which Mr. Thacker was largely responsible.

The Government of India has adopted the scheme and sanctioned the expenditure involved in the establishment of the Power Engineering Department. The department will be a post-graduate one, with a two-year course. It will incorporate all the essentials and the laboratories requisite for turning out first-class power engineers; it will also include a thermal power station of its own with an initial installed capacity of 1,500 kVA, including a Diesel set, and also a mile of experimental transmission line designed for a maximum operating voltage of 132 kV. The course has been planned to give the trainees intensive practical training as well. A national laboratory of high voltage engineering and research will also be linked with it.

Mr. Thacker's address is:—The Indian Institute of Science, P.O. Malleswaram, Bangalore, India.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publicatton. Responsibility cannot be accepted for correspondents' opinions.

Cost of Living Index

MUCH publicity has been given recently to the faulty indications of the Cost of Living Index, but the difference between this and the actual figure is more or less left to the imagination. The Index was never a fair guide after 1926 because it operated on old-fashioned commodities. Those industries whose wages have risen by direct negotiation have received increases of about 70 per cent above those ruling in 1938, but the wages of workers governed by the C.O.L. Index have risen by only 30 per cent. Surely the claims made by negotiation must have been justified for the awards to be granted, and if this is so, there has been a deficiency in the awards to those on the sliding scale.

At a packed meeting of the Electrical Power Engineers' Association in Manchester on May 5th much was said feelingly on this subject. Figures of all kinds were brought forward and graphs were shown which illustrated the ridiculous situation caused by adhering to the Index. Various comparisons, including those of the wholesale prices of commodities, were made and the discrepancy was estimated. This could only be rectified by a 30 per cent increase in present salary rates, and failure to make earlier claims as the gap widened has resulted in loss.

A new Index is being prepared but this will start where the old one leaves off. It will be a true standard but there will be reductions for articles for which a rise in salary has not been given. However, if a 30 per cent increase is gained now it will put the matter right and also ensure that this section of the industry will be treated in a manner comparable to others.

Manchester. CHARGE ENGINEER.

Export Trade Methods

SINCE the secretary of the Institute of Shipping and Forwarding Agents finds it necessary to misrepresent me in the first paragraph of his letter in the *Electrical Review* of May 2nd, he weakens the whole of his subsequent arguments. Had he paraphrased me correctly he would have seen that I wrote in your issue of April 11th: "the business of shipping goods abroad consists *largely* of form-filling," which statement, I venture to suggest, Mr. Redfern himself would not really dispute. Had I intended to convey that the business of a shipping *agent* consisted *solely* of form-filling I would have said so!

As Mr. Redfern forces the issue I assert that in cases where the electrical trader or manufacturer has to maintain an export department, or "capable staff," to deal specifically with his overseas business, experience shows that he can handle his own shipments quite as efficiently and expeditiously as an agent.

On the other hand I willingly admit that for the trader whose export business is not on a very extensive scale, the services offered by a forwarding agent can often be used to advantage, as I pointed out in my article.

*London, E.C.*1. JOHN C. HANCOCK.

Emigration to South Africa

THE Club for Overland Parties to South Africa is receiving so many inquiries lately from men in your own and kindred trades as to whether they would be allowed to take up similar work in South Africa that I give here the official statement for all concerned:

> "The Union Government will welcome and encourage all desirable classes of immigrants. Desirable classes would include the following: Skilled tradesmen and technicians of all classes who intend to pursue their occupations in the Union and who have the physical ability to do so. Also, other types of trained and experienced commercial and industrial employees. Also, persons desirous of establishing new industries or other business activities in the Union and who have the ability and financial resources to do so. Also, persons, irrespective of age, who have substantial financial resources which they will take to the Union."

So now you know! But I must point out to all your readers who come into these classes that this Club, which, with the assistance of various authorities in other countries, is arranging for its members to travel on special combinations of overland and sea routes with a much shorter waiting period than is otherwise necessary, is only

interested to hear from those who are in a position to meet the cost, which is in the neighbourhood of the first-class passage rate, and who are also in a clear position to state the date of their desired travel. That being so, they should communicate with me at once.

Veryan, Cornwall. C. HOWARD THOMAS. *Co-ordinating Secretary.*

Public Transport

MR. CANSDALE, in his letter in your issue of May 9th, agrees that modern trams have advantages where traffic is heavy, but makes an unsupported assertion that they "do *without question*, increase traffic congestion" (my italics). Presumably he means that it is not questioned that the ten standard buses required to seat 560 passengers cause *less* traffic congestion than the seven large modern tramcars which carry the same number. Yet in the *I.E.E. Journal* for March Mr. W. T. Wardale wrote:—"That the tram blocks the roads more than any other vehicle is a popular fallacy; the tram has a well-defined path from which it cannot diverge, and from which even in accidents, it is rarely ejected. It acts as a separator of other street traffic, keeping each stream on the proper side." Later in the same address he quotes another opinion and gives examples to dispel the fallacy. Mr. Cansdale's assertion has been and is being questioned.

Edgware. B. J. PRIGMORE.

APPARENTLY Mr. Cansdale accepts tramway abandonment as inevitable, and his only hope for electric street traction is that some of the tramways will be replaced by trolley-buses.

This attitude has been responsible for a great decline in electric street transport, as many operators have accepted the principle that the tram was obsolete, but not the idea that it should be replaced by the trolley-bus. If, instead, the electrical industry had produced a really modern tram and publicized it as was done in the United States, many systems now abandoned or decaying might be flourishing, and the country's urban transport would have come through the war in a much better condition, owing to the much longer life of electric trams.

In general, streets are wider there than they are here, but many British streets have ample width. In "Street Traffic Flow" (H. Watson—Chapman & Hall) it is stated that trams cause less congestion in all but the very narrowest streets; some of the worst congestion in the country occurs in the tramless centres of London and Birmingham. Most of the main routes in large towns are quite suitable for tramways, though a better layout of tracks and stopping places, including loading islands, would improve them.

Despite the cheapness of petrol in the United States, there are twice as many trams per million population as in Great Britain, whereas we have three times as many trolley-buses and four times as many motor-buses. Trolley-buses in the United States are used for the purpose for which they are most suited—small and medium sized town systems, and outlying and crosstown routes in large cities, where they are replacing motor-buses.

The shortage of steel, it is to be hoped, will not be permanent, and the amount needed by tramways is very small compared with that for railways. Moreover, the experimental Blackpool car has shown itself capable of smooth and quiet running even on badly worn track.

The conversion of three systems—Liverpool, Sunderland and Birmingham—to motor buses (though not for at least ten years) is proposed, although the first two have a considerable proportion of modern cars, and Liverpool and Birmingham a large mileage of reserved track. It is such systems as these that might be encouraged to retain trams on certain routes if really modern cars were shown to them, with suitable publicity, whereas they are definitely against trolley-buses. By the time they are ready to scrap their trams, there should be sufficient steel available. The situation in London, Leicester and Stockport is somewhat worse, as they would probably be scrapped in about five years, but even so a really energetic campaign might have effect.

If on the other hand, the industry continues to assume that trams are a thing of the past, not only will all these systems be replaced by motor-buses, but there is a possibility that some of the towns at present desirous of modernizing their tramways will follow them.

London, S.W.9. F. K. FARRELL, Graduate I.E.E.

Engineering Calculations

IN your issue of May 2nd Mr. J. F. Perrin gave a clear exposition of the ordinary theory of dynamics and the use of the "poundal" unit. I think he is right in preferring this to the rife practice of employing the "engineer's unit of mass" or the "slug" of the Air Force. What is not generally known is how common the latter practice is;

probably half our technical teachers are guilty of it. The attraction of the method is that correct answers can be produced with a class of poor attainments, which is given the tip when to divide by " g " by the use of the magic word " mass." " Mass ? Oh yes, that is w over g." Everyone knows it and any inspector asking such a question would get that for an answer.

For example, a lift cage weighing 1,000 lb has to be raised with an acceleration of 2 ft per sec per sec. Find the tension in the rope.

Tension = $1{,}000 + \frac{1{,}000}{32{\cdot}2}$ (2) lb. (Dead weight + engineer's units × acceleration).

The intelligent student asks, " Why do you divide the second term by g and not the first ? " The exasperated teacher replies, " Did I say mass ? " (The magic word " mass " means $\frac{w}{g}$. "Weight" you leave alone).

There is yet another method of doing such problems and that is the well known one of division by g for " luck." Contrast the above with the method outlined in the *Electrical Review* of April 18th; viz.: 2 ft per sec per sec = $\frac{2}{32{\cdot}2}$ gravits per sec per sec; tension in rope = $1{,}000 + 1{,}000\left(\frac{2}{32{\cdot}2}\right) = 1{,}000\,(1 + \frac{2}{32{\cdot}2})$. Or apparent weight = dead weight (1 + acceleration).

The acceleration measured in gravits (seconds)^a is itself the fractional charge in weight.

I must repudiate Mr. Perrin's suggestion that the " gravit " method is the same as the " engineer's unit " method and also his statement that it means yet another unit because we could shelve the poundal and the engineer's unit. The attraction of the " gravit " method is its reasonableness and simplicity. As teachers we have a grave responsibility to our students. If we teach them tricks like a troupe of performing dogs they will be little benefited by our instruction.

West Ham. D. G. SANDEMAN.

Fuel-saving Measures

THE statutory prohibition of the use of electric (and gas) fires until the end of September, and the appeal to reduce consumption by 25 per cent, are, of course, not intended to eradicate the problem of coal shortage, which will become particularly acute next winter. Unenforceable Orders affecting many millions of people tend to undermine respect for the law generally. Appeals to economize too, impose on the good citizen, while leaving the selfish one untouched. In the much less vital matter of tobacco, the Government has not contented itself with urging economy.

If during the next winter a substantial drop in electricity and gas consumption is to be achieved, there are only two ways likely to be effective:—(1) Compulsory rationing or (2) increase of charges. The only practicable method of rationing would be a statutory percentage cut on previous consumption. Increased charges offer the simplest solution. One can visualize official reluctance to such increases, especially since the price of gas affects the present Cost-of-Living Index. However, the matter might be put across in this way: " The Government wants you in the national interest to reduce your electricity and gas consumption by, say, 25 per cent. Therefore, it has put a purchase tax on these commodities, which will have the effect that if you comply and reduce your consumption by 25 per cent, *you will not be out of pocket by any more than previously*. If you don't obey, it is at your own expense." The " purchase tax " could either go into the Exchequer or be used for purposes directly benefiting gas and electricity consumers at some later date. It should be levied, not as a percentage, but as a flat rate per kWh or therm, supplied to domestic and commercial consumers (e.g., ¼d. per kWh and 3d. per therm, regardless of area and undertaking).

The Government may see another important advantage in adopting the course suggested. With 20 per cent of the actual maximum demand " shed," the present national electricity supply system is working at an artificially increased load factor. Huge additions of plant at highly inflated prices are in hand. Hence there can be no doubt that present charges will have to be increased in due course. It may appear politic to do this before nationalization, rather than after.

ELECTRICUS.

Introduction to Electronics

THIS is the title of a publication brought out by the General Electric Co., Ltd., for distribution, in the first instance, at the British Industries Fair, Birmingham. It is written in a lucid and at times amusing way, eschewing abstruse technicalities but still conveying the essentials of the subject. Many people will be glad to have the list of applications of electronics to gain an idea of the wide scope of the subject.

Chain Welding

Details of Process and Machine Operation

By J. F. Davies

MOST of the power demand of chain-making is due to resistance welding machines and the total load including ancillary plant may amount to between 1,000 and 2,000 kW. The fluctuating nature of the welding demand is largely counterbalanced by diversity between individual machines and between them and electric motors in the same works, so that conditions are approximately those found in the general run of industry.

Chain links are first bent mechanically by feeding cold wire or rod of the required cross-sectional area into forming machines. These machines are largely automatic in operation and discharge a continuous length of chain, of which each link is complete except that the junction is unwelded. A homogeneous butt weld is then made at the ends of each link which are held together under pressure by "pushing-up" tools in a chain-welding machine. Usually alternate links only are initially welded. On passing through the machine they are displaced by 90 deg. and to complete the operation the whole length of chain is rotated through 90 deg. The electrodes make contact with each side of the joint and when the transformer (an integral part of the machine) is energized the metal flows and the link "collapses." This collapse or "upset" automatically cuts off current to the welding transformer and brings into operation burring tools which smooth off surplus metal from the joint.

Electrodes and Arrangement of Machines

The electrode tips are usually detachable and are made of hard high-conductivity copper alloy. The electrodes are cooled by water from a gravity-feed tank served by an automatic float-controlled pump. Distinctively coloured flow and return pipes are best carried above and parallel with each row of welders with branch-cocks for individual sets. Welding machines are most suitably arranged back-to-back in double rows and spaced to allow for free all-round access and for manœuvring small run-about trucks between them.

The chain welder is essentially of the special-purpose type. Both mechanical and electrical considerations limit the range of work that can be efficiently covered by one machine, e.g., diameters of from $\frac{1}{4}$ to $\frac{3}{8}$ in. or from $\frac{3}{8}$ to $\frac{1}{2}$ in., and the transformer capacity is suitable for that range. Where the plant is too small for this procedure to be practicable, the machine has to be set up for each size of chain, entailing alterations of electrodes, feed mechanisms and "pushing-up" arrangements.

Machine speeds are low, but suitably proportioned stepped pulleys give all the speed range required when using high speed motors. The latter should be liberally rated in view of the possibly high ambient temperature owing to the proximity of hot chains, but special winding insulation is not called for. As the motors are usually of only 3 to 7 H.P. direct-on-line starting can usually be adopted.

Although five or six machines up to 5 kVA each can be grouped on one circuit which allows for a certain amount of diversity, individual drives should be adopted as much as possible to give the advantages of isolation and individual control and to avoid interference with lighting.

Drip-proof motors fed from ironclad distribution boards fitted with isolators are recommended, local emergency stop buttons being installed within easy reach.

Methods of Wiring

Wiring to individual machines should be in solid-drawn conduit preferably sunk below floor level in order to avoid damage from heavy chains. Alternatively, the overhead busbar system with fitted-in boxes has much to recommend it where rearrangement of the machines may become desirable later. Experience has shown the value of an ample number of plug-points for inspection lamps when setting up or adjusting the machines.

As forming machines are usually installed in permanent positions there is little likelihood of a well-planned lighting installation being rendered less efficient owing to their rearrangement. Mercury-vapour lamps and fluorescent lighting have proved eminently suitable for this class of work.

Cables can usually be carried over roof trusses and means for isolating each department should be provided in the main substation. The loads supplying the welding machines should terminate in ironclad isolators or fuse switches.

The power required for chain welding varies according to the cross-sectional area to be welded, the mechanical pressure applied and to the conductivity of the metal which is greater for non-ferrous than for ferrous metals. Typical figures are given in the accompanying table. During welding,

Diameter of chain link	Cross-sectional area, sq in.	kWh per 100 welds	Welding time in secs.
$\frac{1}{16}$	0·076	1·2	2
$\frac{3}{32}$	0·110	1·5	4
$\frac{1}{8}$	0·150	2·4	6
$\frac{5}{32}$	0·196	3·3	8·5
$\frac{1}{4}$	0·248	4·2	10
$\frac{5}{16}$	0·306	5·0	15

magnetic material must be excluded from the magnetic field created by the heavy secondary currents, as its presence will introduce additional reactance and lower the voltage obtainable at the welding terminals.

As it is important that the correct secondary voltage should be applied to give the maximum production consistent with good welding, adequate means of varying it should be provided. This usually takes the form of tappings on the transformer primary and a plug-in tap-changing arrangement for the use of the machine operator.

Ten or twelve tappings are not too many for the range of work covered by one machine. They should be so arranged that an average secondary voltage variation of about 0·2 to 0·25 V is obtained. An increase of secondary volts from 2·0 to 2·25 represents a 12·5 per cent rise, giving an appreciable increase in the rate of heating.

Position of Transformer

A welding transformer is usually air-cooled, but if located in the base of the machine it is subjected to high ambient temperature and to risk of damage from sparks and hot-metal chippings. The alternative of mounting it at the rear of the machine at such a height that its secondary leads can be carried over the machine to the electrodes has the disadvantages of lengthening the leads and making the equipment less compact. Current to the transformer primary of small chain-welding machines can be directly controlled by switches that are cam-operated at the appropriate time by the machine rotation. For machines of medium and large capacity, contactor control is needed, the machine then merely operating the control switches. Where the chain to be welded is of large cross-sectional area, an increased secondary voltage can be applied, provided it is reduced near welding point. The point of cut-in of the lower voltage contactor which selects the appropriate primary tapping can be determined by time switches.

Contactor gear should be ironclad with easily renewable contacts. For heavy service of this kind a.c. magnets can become noisy owing to broken silencing rings or shading coils and it has been found advantageous to replace them by d.c. contactors fed from metal rectifiers on the contactor panels.

Power-Factor Correction

When static condensers are associated with individual welding sets for correcting their low power factor, which may thus be raised from about 0·7 lagging to 0·95 leading as an average value, they should be energized only when the welding transformer is connected in order to avoid drawing a high leading current from the mains at other times.

Group power-factor correction can be applied to small machines if the diversity factor is high. The power factor at peak loads is the most important, as this affects the overall rate per kWh if the supply tariff is on a kVA basis. In order to avoid this, some measure of automatically limiting the load of less essential sections of the works may be advisable. The inspection department for the finished chain should be so constructed as to receive the maximum of natural light over a general lighting installation giving a generous foot-candle intensity. Mercury-vapour or fluorescent lamps show up clearly any cracks or faults in the chain links. Some supplementary local lighting for inspection branches may also be necessary.

Details of the " proof load " test, generally twice the permissible working load (e.g., for a ½-in. diameter chain it is 3 tons for a safe working load of not more than 1 ton 10 cwt.), and other tests required for elongation, ultimate breaking strength and " up-ending " are laid down in B.S. 590. The hydraulic testing machine is driven by a slip-ring motor controlled by an ironclad floor-mounted starter, preferably with contactor gear and push-button control.

Canteens in Industry

The Industrial Welfare Society has published the sixth edition of " Canteens in Industry " which deals, among other matters, with canteen planning and construction, kitchen lay-out, methods of service, staff selection and management, food and diet.

PARLIAMENTARY NEWS

By Our Special Reporter

MR. W. Elliott asked the Minister of Fuel and Power if he could now make a statement regarding the relaxations of the Control of Fuel (Restriction of Heating) Order, 1947.

Mr. Gaitskell said that after further consultation with representatives of the women's organizations and with the Minister of Health, the Minister of Fuel and Power had issued a licence permitting the use of gas or electricity for heating residential premises in so far as it was necessary for the health of children under the age of three and persons over the age of seventy. He would also remind the House that gas and electricity might be used for heating when a certificate was given by a registered medical practitioner that it was necessary in the interests of health of any person. The licence which the Minister had issued also permitted the use of gas or electric heating for the drying of wearing apparel and household linen and for drying premises affected by floods. He was satisfied that in that way they were providing for the reasonable needs of all.

Telephone Kiosks

In reply to Sir Gifford Fox, Mr. Paling, the Postmaster-General said that the Post Office aimed to provide about 1,700 kiosks a year for the next four or five years, but actual achievement would depend on the rate of supply of kiosks and of the associated components. The number of kiosks at present on order was 7,500, of which 3,100 had been supplied. The remainder were now being delivered at the rate of about 200 a month. It was not usual to disclose contract prices, but the cost of the kiosk itself was a relatively small part of the £160 which represented the average cost of providing an installation.

Export of Electrical Plant

Colonel J. Hutchinson asked the President of the Board of Trade for what reason he permitted the export of nineteen big transformers and two electric power houses to U.N.R.R.A. during 1947. Mr. Belcher said that this equipment was supplied in fulfilment of long-standing orders placed as part of the United Kingdom contributions to U.N.R.R.A. It was specially designed for use as emergency plant to provide a temporary and limited power supply in devasted areas pending the re-establishment of normal facilities.

On May 12th, Mr. A. Woodburn, replying to Commander Galbraith, said that at March 1st, the latest date for which figures were available, 1,609,000 kW of steam plant of 10,000 kW and over, and 917,000 H.P. (approximately 650,000 kW) of hydro plant were being constructed for export. It would not be practicable to divert this equipment for home use. Arrangements had, however, been made to ensure that future export orders did not interfere with home requirements.

Electricity Bill

Area Boards' Tariffs and Charges

STANDING Committee E of the House of Commons last week considered Clause 33 of the Electricity Bill (Fixing and Variation of Tariffs).

Col. Clarke moved an amendment to Sub-Section (1) which reads: "The prices to be charged by the Central Authority for the supply of electricity by them to Area Boards shall be in accordance with such tariffs as may be fixed by the Authority from time to time." The amendment was to add the words: "and approved by the Electricity Commissioners." He said that the amendment had been asked for by the companies. It presupposed that the Electricity Commissioners would not be dissolved. At the point they had reached in the Bill they were not; that matter came in a later Clause. Even if they were dissolved the amendment would stand, for by Clause 51 the Minister would take over the powers of the Commissioners.

The real point of the amendment was to ensure that there was an independent scrutiny of the really vital item of charges for supplies, which were the main function of the Central Authority.

Mr. Gaitskell, Parliamentary Secretary to the Ministry of Fuel and Power, said that the amendment sprang from the different conception of the relations between the Central Authority and the Area Boards which the Opposition had as compared with the Government. If they were to have Area Boards as completely separate identities with financial independence, there might be a case then for interposing in this matter of the tariff to be charged for bulk supplies, and there might be something to be said for some form of arbitration by the Electricity Commission or some other body such as was proposed in the amendment. However, that was not the Government's conception of the relationship between the Area Boards and the Central Authority. Although they said that the Area Boards were to have certain freedom and a reasonable amount of autonomy, the Central Authority was financially responsible

for the whole of the set-up, and the price at which it might sell electricity to the Area Boards was an essential internal matter, regarding which it was not necessary to introduce any outside arbitration.

Sir Arnold Gridley asked whether if the charges to the Area Boards were too high, there would not be a risk of losing business. Mr. Gaitskell said he agreed but obviously if the Central Authority behaved in such a way that it would cut across all the things which are enjoined upon it in this Bill, it would not be very successful, but he did think that that should be assumed. If the Central Authority were to charge too little the revenue position as regarded that Authority compared with the Area Boards would be the other way round. They had deliberately arranged for the Area Boards to be represented on the Central Authority and the Government therefore did not feel that there was any need for outside intervention.

The amendment was negatived.

Form of Tariffs

Sir Arnold Gridley moved an amendment to provide that the tariffs should be so framed as to include as part of the charge and show separately: (*a*) a fixed kilowatt charges component, and (*b*) a running charges component, ascertained in accordance with such principles as might be approved by the Electricity Commissioners. The tariffs thus fixed should be such as, taking one year with another, would not result in a financial loss to the Central Authority as respected any area, and accordingly might, if the Central Authority thought fit, be different for different areas.

He said that the amendment followed a procedure which had been very well established over a long period of years. It was important that the Area Boards, who were to take electricity in bulk from the Central Authority, should be able to continue to prosecute their selling policy on this well-tried, thoroughly established and sound type of tariff.

Mr. Palmer hoped that the Committee would reject the amendment which, he felt, was deliberately designed to restrict the powers of the Central Authority in carrying out its trading activities. It attempted to stabilize and to give statutory authority for the two-part tariff system and to lay it down as the very cornerstone for all time of the financial relations between the Central Authority and the Area Boards. No one who had had any experience of the electricity supply industry had any particular objection to the two-part tariff as such. So far, it was the most satisfactory method yet devised for reflecting, in accurate financial terms, the peculiar economic nature of the supply of electricity. He completely agreed with Sir Arnold Gridley on that, but it was by no means a perfect tariff. It was preferable to leave the matter open for free discussion between the Central Authority and the Boards.

Mr. Gaitskell said that the wording of almost the whole of the amendment was taken from the 1926 Act. When that Act was passed, there was some justification for phraseology of that kind, as there had been very little experience in the selling of bulk supplies, and the grid was not in existence. Furthermore, there was a clash of financial interest between the Central Electricity Board and the various consumers. The position was very different under the Bill. He was sure Sir Arnold Gridley would agree that the system of the two-part tariff was well adapted to industry, and that the question of tariffs was a highly technical one, in which there was room for a considerable amount of research and experiment. It would be almost an anachronism, certainly a mistake, to tie down the Central Authority in that way as regarded the particular form of tariff which might be adopted in the sale of bulk supplies.

On the other hand, with the second part of the amendment he had rather more sympathy. It certainly was not the intention of the Government to prevent the Central Authority from charging different amounts to different Area Boards. If the Opposition was particularly anxious that that point should be stressed he was prepared to make the necessary amendment at a later stage. He could not accept the other proviso contained in the amendment. He did think they should tie down the Central Authority in no circumstances to make a loss in its dealings with Area Boards.

On this understanding, Sir Arnold Gridley withdrew his amendment.

Restrictions on Area Boards

Sir Arnold Gridley moved to omit Sub-Section 4, which empowers the Central Authority to "give directions to any Area Board requiring them, in such classes of cases as may be specified in the directions, to obtain the approval in writing of the Central Authority before exercising their powers under the foregoing provisions of this section." He said that this was a restriction on the expert staffs of the Area Boards which might be extremely hampering and might quite well result in the loss of business. Latitude had to be given to those who were carrying on negotiations with important consumers. It should be remembered that two-thirds of the power supplied was for industrial purposes, and here they were dealing with by far the larger and more important proportion of the whole business.

Mr. Gaitskell said he was advised that there were occasions on which it would be highly inconvenient, and even financially dangerous, to the organization, if one Area Board were to charge very different rates from those of another in respect of one particular class of consumer. They might have a particular industry banding itself together to beat down the Area Boards, and unless they stood firm together on the point it might lead to awkward financial consequences. The Government did not want to leave them in

a position where one could be played off against the other. That was really the main reason, though not the only one, why the Government thought it desirable to give the Central Authority permission to do this. They were not asking for continual intervention. This provision was only permissive, and he thought it would be unwise to drop it altogether. He was, however, prepared to have a further look at the wording of the sub-section, and on that assurance, Sir Arnold Gridley withdrew the amendment.

On Clause 34 (Borrowing Powers of Central Authority and Area Boards) Mr. Shinwell, the Minister of Fuel and Power, replying to a number of Opposition questions, said that it was very difficult to specify a figure of expenditure beyond which the Central Authority must not proceed.

Clearly, the Central Authority could not proceed without the consent of the Minister, and no Minister would ever grant powers to the Authority without having some conversations with the Treasury, and ascertaining their opinion. As regarded the general expenditure of the Authority in its programme of extensions and developments, he gave some figures at a meeting on May 7th which were based on the reports presented by the Electricity Commissioners as to contemplated expenditure on new stations and extensions from this year until 1950, and on the basis of the programmes contemplated it amounted to £247 millions. That had nothing to do with the Government. That figure was based on programmes submitted by municipal electricity undertakings and private undertakings, with the consent of the Electricity Commissioners. If within the narrow limits of development which had existed in the past few years, and, indeed, existed now, on account of the difficulty of procuring new materials, labour and the like, it was contemplated that they should expend £247 millions, it was obvious that with greater development much more than this sum would be expended, or at any rate that programmes would be prepared for spending more.

Viscount Hinchingbrooke asked why there was no limit to the powers of borrowing. In the Transport Bill there was a limit of £25 millions; why not limit electricity in the same way?

Mr. W. G. Hall, Financial Secretary to the Treasury, intervening, said that both in the Transport Bill and the Electricity Bill, an overall limit was set. In the Transport Bill permanent borrowing and temporary borrowing were fixed, but there was an overall limit in both cases. What they were doing in the Electricity Bill was not to say how much of the overall limit should be temporary and how much permanent, but that there should be elasticity and flexibility for the Authority to decide for itself at any given time.

Viscount Hinchingbrooke said that in the Electricity Bill there was an overall limit of £700 millions for borrowing, but no overall limit for temporary borrowing. That was the difference between transport and electricity.

Mr. Elliott said that they were considering the question of whether to have an unlimited figure which was countersigned by the Treasury, or to have a fixed limit on the responsibility of the Minister. Would the Minister insert the words: " and the approval of the Treasury " ?

Mr. Shinwell promised to consider the suggestion. The amendments were, by leave, withdrawn.

I.E.E. Annual Report

Activities in 1946

THE seventy-fifth annual general meeting of the Institution of Electrical Engineers was held yesterday (Thursday) evening, when the Council presented its report for 1946–7. During the twelve months ended March 30th, the membership increased by 2,102 to 31,260, of whom 14,501 are corporate members. The arrangement under which the subscriptions of those serving in the Forces abroad were halved was terminated as from December 31st. A formal ceremony of admission to corporate membership was inaugurated on October 3rd. In two cases proceedings were authorized against persons for falsely using initials signifying membership. By the terms of the Supplemental Charter of November 19th, 1946, the annual value of real property that may be held by the Institution has been raised from £10,000 to £50,000. The general organization of the Institution is displayed in diagrammatic form which shows the links between the Council and various subordinate formations.

Meetings held in London and at the local centres numbered 1,115, of which 419 were general meetings. The average attendance at the fifteen ordinary meetings in London was 327. For the Sections the number of meetings, average attendance and total membership were: Installations—8, 110, 2,339; Measurements—13, 120, 1,323; Radio—29, 230, 3,311; Transmission, 10, 134, 6,932. A new feature of the Measurements Section was the holding of discussion meetings, alternating fortnightly with the normal meetings. In collaboration with the Government, a Radio Communication Convention was held from March 25th to 28th and on April 2nd, when fourteen papers were presented and equipment was exhibited; the maximum attendance was 430 and the minimum 195. In addition, over 100 supporting papers were received and the whole will be published in special issues of the *Journal*. The definition of the scope of the Transmission Section has been modified to make it clear that it includes

associated apparatus. Six informal meetings were held with an average attendance of 106; members are invited to suggest subjects for discussions.

Next session Section chairmen, on the request of local groups, will make visits similar to those paid by the president and vice-presidents and the hon. treasurer, who visited all the local centres and sub-centres. The East Midland Sub-Centre was elevated to a centre with increase in area to include the Cambridge Radio Group and three other sub-centres had their areas extended. A Transmission Group is being formed in the Western Centre.

The number of Students' Sections in operation was increased to thirteen by the formation of one in Rugby. The concession granted in 1941 that enabled graduates of over 28 years to remain in Students' Sections during the war has been discontinued. The annual conferences of honorary secretaries of Students' Sections, in abeyance during the war, have been resumed. Meetings abroad have been arranged by the Argentine, Calcutta, Ceylon (new) and Irish Branches and by the Bombay, Lahore, Queensland and Transvaal Overseas Committees. Visits to various countries of the Commonwealth were made by senior members of the Institution.

Codes and Contract Conditions

Codes of Practice on seven subjects outside the scope of the independent Codes of Practice Committee are to be prepared for ultimate publication by the British Standards Institution. Two relating to the abatement of radio interference from electro-medical and h.f. industrial equipment and from internal-combustion engines, and another for the installation and maintenance of flameproof equipment are approaching finality. Model conditions of contract are under discussion with the Institution of Mechanical Engineers; their form is expected to be generally similar to that of the existing electrical Model General Conditions "A." A first draft of regulations for the electrical equipment of aircraft has been prepared and regulations for the design and installation of radio equipment for civil aircraft have been transmitted to the Ministry of Civil Aviation.

Appointments Bureau

In its first year (ended December 31st) the Professional Engineers' Appointments Bureau had an average number of 964 (360 electrical) on the register. Employers notified 1,150 vacancies (312 electrical). At least 217 applicants (68 electrical) were placed, a further 158 did not accept appointments offered, mostly because of lack of living accommodation.

Theses were submitted by forty-four candidates in lieu of examination for associate membership and accepted in twenty cases; eighteen candidates were examined orally. A modified form of cadetship is to take the place of the scheme in operation from 1943 to 1945, in order to augment the supply of officers to the technical branches of the Army.

During the year the number of readers in the library totalled 9,000 and of book borrowers 2,398 (4,159 volumes). The retirement of Mr. A. E. Rayner, assistant secretary (administration) on February 28th after forty-seven years' service is recorded; he is succeeded by Mr. F. C. Harris, who has served on the staff since 1912.

Benevolent Fund

At the end of last December the capital of the Benevolent Fund of the Institution stood at £48,237, including a transfer of £8,750 from income. The latter, at £10,193, was made up of dividends and interest (£1,719), 95 subscriptions and donations of £5 and over (£1,925) and 11,984 of under £5 (£6,549). The last two items, coming from 39 per cent of the whole membership of 30,611, represented an average of 5s. 6d. per member. Grants totalling £5,583 were made to 86 persons, of whom two-thirds were not contributors, or their dependants. More than 1,000 contributors undertook to subscribe for seven years, which enabled nearly £1,100 to be recovered in income tax.

During its first full calendar year, the Homes Fund (the Institution's memorial to those who lost their lives in the last war) received £3,891, of which £100 was interest and £3,791 subscriptions and donations by 3,191 members, which included £1,786 provided by 165 members. The £50,000 needed to implement the scheme would be forthcoming if members subscribed in accordance with a stated scale related to class of membership. The Wilde Fund (for full members and dependants) of £3,050, all invested, brings in about £106 per annum and grants totalling £157 were made. The Lord Hirst Fund, for assisting those who have rendered important services to electricity (not necessarily I.E.E. members) had a capital of £12,643, all invested, and produced £376.

Aircraft Navigation Aids

Standardization of Equipment

THE standardization of radar and radio aids to aircraft navigation is being attempted by the Provisional International Civil Aviation Organization (PICAO) as a means of increasing the safety and regularity of air transport. Demonstrations of airways equipment were staged last year by the Governments of the U.K., U.S.A. and Australia, following which delegates and observers met in Canada to decide upon the systems to be adopted and substantial agreement was reached in four categories. The conclusions and recommendations of the Special Radio Technical Division are contained in a final report (first session) of 84 pages printed in English with seven diagrams and three maps. This report (ref: Doc. 2553, COT/26) is obtainable for 75 cents from the secretary general, PICAO, Dominion Square Building, Montreal, Canada.

COMMERCE and INDUSTRY

E.T.U. and Supply Industry.

SPEAKING at the annual conference of the Electrical Trades Union at Margate last week, Mr. Shinwell referred to the organization which it was proposed to set up under the Electricity Bill. The Area Boards, as far as was practical, would have complete autonomy. The Consultative Councils, with accompanying committees, would be rather more than consumers' councils; they would be able to make representations not only on matters affecting the immediate needs of consumers but also questions affecting expansion, development and reorganization.

It would be seen in due course that provision had been made for the representation of those who had high knowledge of the organization of workers on a very reasonable scale. He intended to consult representative trade union organizations in selecting the personnel of the boards. They must make provision for the utmost consultation between the workers' representatives and those who were appointed to the boards.

The Government intended to safeguard the rights of every employee. That affected compensation for persons who might be regarded as redundant. There would also be safeguards in the matter of pensions.

Among the matters raised at the conference were shorter hours, increased wages, holidays with pay, payment during illness, the guaranteed working week, a separate national agreement on work and wages in the radio industry, and equal pay for men and women.

Electrical Machinery Traders

In the course of his address at the second annual general meeting of the Association of Electrical Machinery Traders, Mr. W. E. Lawton (chairman) said that the most important development during the past year was the adoption of the Association's standard conditions of trading which were obligatory upon members. A limited publicity campaign had been instituted and it was hoped to finance it by the sale of transfers to members; up to the end of the year the sales had been disappointing but they had since improved. The Association's representatives on the Government Disposal Panel had seen to it that there would be no private disposal or arrangement with any single large organization to the detriment of smaller traders. Members had been asked to explain the circumstances to customers when they were forced to quote prices which appeared high. They wanted to cultivate a reputation for a square deal.

Mr. R. A. Joseph proposed the adoption of the chairman's report and Mr. T. A. Atkinson seconded. Mr. Lawton was re-elected chairman, Mr. Atkinson was appointed vice-chairman and Mr. G. H. Holding treasurer.

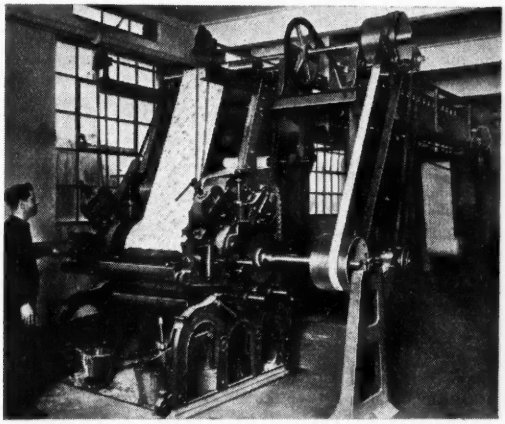
Plans for "Design Weeks."

Lead for Cables

The latest Ministry of Supply statement shows that during the first quarter of this year the electric cable industry used 20,961 tons of lead out of a total home consumption of 70,860 tons. Battery manufacture absorbed 6,192 tons and 4,581 tons of oxides and compounds.

Drying Wallpaper Colours

The Willad Paper Mills have recently installed a "Metrovick" infra-red plant for drying colours on wallpaper which enables the paper, as shown in the accompanying illustration, to be rolled immediately it passes through the drying oven. This is one of the means adopted by the wallpaper industry to meet the huge demand at the present time and to bring nearer the day when a choice of wallpaper is possible. The usual method of festooning the paper in hot air ovens is completely eliminated. Drying times vary, depending upon the depth



"Metrovick" electric infra-red plant for drying colours on wallpaper

of colour deposit applied. This plant is 18-ft long, employing 132 "Metrovick" infra-red lamps with a load of 33 kW and deals with 22-in. wide paper with a normal print deposit in various colours at the rate of 90 ft per minute. Plants 27 ft long fitted with 198 lamps are now being constructed to deal with up to 150 ft of paper per minute. The application of this type of plant is not confined to wallpaper drying and the Metropolitan-Vickers Electrical Co. has installed plants for drying purposes in the textile, boot and shoe, and many other industries.

Design Weeks

At the close of the "Britain Can Make It" Exhibition it was announced that a series of "Design Weeks" would be held in the leading industrial centres of this country. The Council of Industrial Design in co-operation with the Federation of British Industries and the Association of Chambers of Commerce and with the support of the civic authorities has now completed the preliminary plans for these "Design Weeks." The first will be held in Newcastle-on-Tyne from July 7th to 12th inclusive. Other cities where "Design Weeks" will be held include Manchester in September, Birmingham in November, Cardiff in January 1948, and Bradford in March 1948.

Science as a Career

The Institute of Physics (47, Belgrave Square, London, S.W.1) has produced a booklet entitled "Experimental Science: A Career for the Practical Boy or Girl" as a brief guide for students and employers to courses leading to the award of National Certificates in Applied Science. It mentions and illustrates examples of the kind of work open to students and says something about prospects.

Water Heating Conferences

The Northmet Power Co., is holding a series of three water heating conferences at six different centres within its area of supply to which officials of county and local authorities engaged in the design and erection of new housing estates, architects, estate agents and surveyors, building and electrical contractors, plumbers, etc., are invited. Each conference is opened with a description of the methods of water heating adopted by the company, illustrated with lantern slides and samples of immersion heaters, thermostats, thermal insulation, etc. This is followed by a general discussion.

The first conference dealt with energy consumption and cost of electric water-heating with details of apparatus. The second of the series opened on May 1st at the company's Wood Green showrooms when a preliminary survey was made of an existing installation, and the conversion of existing tanks and cylinders to electric heating was discussed. The third conference opens on May 22nd at Kingsbury, when the safety aspect of domestic hot water supply installations will be considered and some of the more common causes of complaints of the alleged excessive consumption of energy and cost of electric water-heating will be dealt with. Conferences will subsequently be held at the following of the company's showrooms:—Hendon (June 2nd), Wood Green (June 5th), Chingford (June 9th), Ware (June 12th), and Hatfield (June 16th).

Argentine Import Restrictions

The Argentine Central Bank has decided to suspend distribution of certain imports among importers "in order that the Argentine institute for the Promotion of Foreign Trade may reserve itself the import quotas established for these commodities in December, 1946." The goods affected include insulated wires or cables for underground use, with interior lead covering and outer sheathing of steel or iron; incandescent lamps (excluding fluorescent tubes) and batteries. Also until further notice, no exchange permits will be granted for the import of "ordinary" radio receivers and loud-speakers.—*Reuter's Trade Service.*

Gas Turbine Power Station

One of the largest Swiss electricity companies, the Nordostschweizerische Kraftwerke A.G., has decided to erect a new thermal power station at Weinfelden, Canton of Thurgovie, in order to supplement the winter energy supplied by the existing hydro-electric plant. The station is to be equipped with a 20,000-kW gas-turbine unit, built by Sulzer Bros., Ltd., which will operate on the special cycle developed by this firm and will drive a 25,000-kVA generator. The oil tanks of the station will have a capacity corresponding to a production of 60 million kWh. The commencement of service with the new plant is planned for the winter of 1949-50.

Electron Microscope for Northampton Polytechnic

The Education Committee of the London County Council has sanctioned expenditure not exceeding £2,700 for the purchase and installation of an electron microscope at Northampton Polytechnic for the use of that and other polytechnics and technical institutes.

Electrical Housecraft Exhibition

The Caroline Haslett Trust is now inviting applications for the second travelling exhibition, which will be tenable in Sweden during the coming autumn. The successful applicant, who must possess the diploma in electrical housecraft of the Electrical Association for Women, will travel in Sweden for two or three months to study home economics, particularly in the application of electricity to housecraft. She will meet the leading women of the Swedish home economics world and will acquaint herself with

publicity methods adopted there. She will visit domestic electrical equipment factories and will hope to see, both in the home and out of it, the latest electrical developments.

Electrical Domestic Science School

An intensive course for demonstrators and domestic science teachers is to be held from July 28th to August 1st, inclusive, at the London School of Electrical Science, Imperial Court, Basil Street, Knightsbridge, London, W.3, and applications should be sent to the secretary as soon as possible. The course will cover cookery, laundry, housewifery and theory of electricity, and the inclusive fee is £4 4s., plus 7s. 6d. covering lunch for the five days. It will be recalled that the School was taken over by the Jackson Electric Stove Co., Ltd., a short time ago.

Radio and Marine Navigation

At the second international meeting on Radio Aids to Marine Navigation, which began in New York on April 28th, papers relating to progress in Great Britain during the past year were presented by Captain R. W. Ravenhill (Admiralty) who reviewed navigational needs and the systems available to meet them, Mr. W. Roos (Ministry of Transport), who described the Decca hyperbolic system, and Mr. C. E. Horton (Admiralty Signals), who dealt with radar with especial reference to 3-cm transmission. The conclusion reached by the U.K. delegation (which also circulated other papers bearing on the subject) was that a combination of radar and Decca was best in pilotage and coastal waters and that Consol stations (established primarily to assist aviators) would cover ocean aid.

Sales Conference

A sales conference of all the British and overseas representatives of the Driver-Harris Company, manufacturers of "Nichrome" electrical resistance alloys, headed by Mr. F. L. Driver, Jr., chairman of the company, was held on May 8th and 9th, at the Manchester offices. Each day the morning business session was followed by luncheon at the Midland Hotel, the afternoon being devoted to further business discussions and inspection of the plant.

German and Japanese Industrial Reports

Reports on German industry published last week bring the total now available to 1,977. Two further Japanese reports received from Washington are also available. The reports may be obtained from H.M. Stationery Office and are available for reference at the principal public libraries.

Those of electrical interest in the latest list are as follows with net prices:—C.I.O.S. XXVIII-31: "The X-ray Industry in Germany" (amended) (3s.). B.I.O.S. 415: P. J. Kipp en Zonen: "Galvanometers" (6d.). B.I.O.S. 1196: "German Instrument Wire Industry" (4s.). F.I.A.T. 895: "Progress in Time and Radio-frequency Measurements at the P.T.R. Heidelberg" (17s. 6d.). B.I.O.S./JAP/PR/215-311: "Report on Permanent-Magnet Alloys Produced in Japan" (2s.). A consolidated list of German reports up to October 27th, 1946, classified under subject headings, is issued at 6d. and supplementary monthly lists up to February at 2d.

Water Heater Production

Referring to the sub-title of the article on this subject in the *Electrical Review* of May 9th ("Bringing New Industries to Scotland") Johnson & Phillips, Ltd., point out that this is somewhat misleading. All kinds of storage and immersion water heaters have been made in Scotland since 1934 by the company and its associate Archibald Low Electrics, Ltd. The factory at Newarthill producing these and other domestic electrical appliances, is claimed to be the largest of its kind in Scotland.

Revo at the B.I.F.

This year the Revo Electric Co., Ltd., did not have a stand at Castle Bromwich, but showed examples of its most recent street lighting columns and fittings in the outdoor section. The principal exhibit was a "Britannia" standard fitted with the "Sol-Etern" unit.

Marconi Delegates at Stafford

Fifty delegates from thirty countries, including the Marchese Marconi, guests of the Jubilee Convention organized by Marconi's Wireless Telegraph Co., Ltd., visited the English Electric Co.'s Stafford Works on May 6th, when they were welcomed by Sir George Nelson, chairman and managing director of the English Electric Co., and chairman of the Marconi group of companies. The delegates were entertained to lunch at the Swan Hotel.

Contract Price Adjustment Formulæ

The latest figures for use in connection with the B.E.A.M.A. contract price adjustment formulæ are as follows:—Rate of pay for adult male labour as at May 10th, 110s. (unchanged). Board of Trade index figure for intermediate products, May 10th: 215·9, the figure for April (against 213·0 for March).

Rubber Supplies

Mr. F. D. Ascoli, the chairman, addressing the annual meeting of the Rubber Growers' Association recently, said that world production of rubber at the end of last year was running at a rate of more than 1,200,000 tons per annum, or five times the 1945 figure. The probable production for 1947 ranged between 1,200,000 and 1,500,000 tons and the total shortage was likely to vary between 500,000 and 800,000 tons, made up by various synthetic rubbers. The

figures suggested the probability of a reasonable balance between supply and demand. In the past few months, Mr. Ascoli said, there had been a remarkable swing-over, on the part of leaders of American industry, in their views towards the use of natural rubber. The use of such rubber in manufacture was, however, being limited in America by specification control, which was to be continued until March, 1948, in order to avoid the possibility of a natural rubber famine which otherwise might arise.

Fluorescent Office Lighting Installation

The offices at Royal Mail House, Leadenhall Street, London, of the Royal Mail Lines, Ltd., are being lighted entirely by "Sieray" warm-white fluorescent 80-W tubular lamps. The rooms are of varying dimensions from 8 ft by 10 ft up to 40 ft by 100 ft, with a ceiling height of approximately 9 ft 6 in. throughout. The majority of the ceilings are traversed by cased beams, and consequently a uniform mounting height of 8 ft was selected. A feature of the scheme is the use of open top trough fittings sprayed cream externally. Both single and two-lamp open top fittings are in use as well as decorative fittings glazed with opal "Perspex." The scheme provides for a uniform intensity of 15 lumens per sq ft in service, this value being obtained at desk-top height. The system is remarkably free from glare, and the use of local desk lamps is entirely avoided. The scheme was prepared by the Illuminating Engineering Department of Siemens Electric Lamps & Supplies, Ltd., and the installation was carried out by Rashleigh Phipps & Co., Ltd.

Immersion Heater Manufacture

A good example of enterprise to suit post-war conditions is to be found in the entry three years ago of the Birmingham firm, Precision Electric, Ltd., into the immersion heater market. The company was formed in 1925 and it may be remembered that before the war it made the "Arega" radio sets, including the "Radiomant" combination fireplace surround and radio set. During the war it turned over to making high-precision gauges. In 1945 it was decided to embark on the manufacture of immersion heaters, and every component, including the thermostats, has been designed and made on the premises.

New E.A.W. Branch

The inaugural meeting of the Cambridge and District Branch of the E.A.W., took place recently at the Guildhall. Under the chairmanship of the Mayoress (Mrs. F. Doggett) the chief speakers were the Mayor (Councillor F. Doggett), Miss Caroline Haslett (E. A. W., Director), Mr. M. D. Bradford and Mr. P. Sydney (chairman and general manager respectively of the Cambridge Electric Supply Co.). The formal resolution proposing the formation of the branch was proposed by Lady Butler and seconded by Mrs. Bradford. The Cambridge Electric Supply Co. arranged an electrical exhibition and a tea at which thirty-five members were enrolled.

Trade Publications

The Chloride Electrical Storage Co., Ltd., Exide Works, Clifton Junction, near Manchester. —Illustrated publications relating to "Exide" and "Drydex" batteries, together with instructions for operating and charging "Exide" "Mass" type cells.

Oldham & Son, Ltd., Denton, Manchester. Illustrated folder on rechargeable accumulator hand lamps, safety and flameproof types, in moulded ebonite, aluminium, and rubber-cased containers; also safety torches for use in explosive atmospheres.

Expanded Metal Co., Ltd., Stranton Works, West Hartlepool.—Booklet giving illustrated particulars of expanded metal resistances for industrial, marine and traction applications.

Morphy-Richards, Ltd., St. Mary Cray, Kent. —An illustrated leaflet giving particulars of "Cyldon" chimes, including new models TC.110 and B.120.

Metway Electrical Industries, Ltd., King Street, Brighton.—Illustrated price list of elements and spirals, fire bars and tubular bars.

Tufnol, Ltd., Perry Barr, Birmingham, 22B.— Illustrated booklet on non-metallic gear wheels and pinions made of resin-bonded compressed fabric.

Philips' Aid to Poland

An agreement has recently been signed between the Philips Co. and the Polish electrical industry on the basis of which Poland is to receive technical aid with regard to industrial installations, and supplies of semi-manufactured products and raw materials. Polish electrical engineers will be admitted to the Philips factories for training and practice.

Dissolution of Partnership

The partnership between Messrs. W. J. Morgan and A. H. Mainstone, carrying on business as electrical engineers at 452, Badminton Road, Yate, Glos., under the style of Morgan & Co., has been dissolved by mutual consent. Mr. Morgan will attend to debts and carry on the business under the same title.

Trade Announcements

Crown Appliances, Ltd., has removed to 18, Gipsy Hill, London, S.E.19 (telephone: Gipsy Hill 0354).

The telephone number of the London office of Vacuum Cleaners & Electrical Supplies, Ltd., is now Gipsy Hill 4014.

G.P.U., Ltd., Palace of Engineering, Wembley, states that it has completed an arrangement with the Eagle Star Insurance Co., Ltd., aimed at developing a nation-wide plant inspection and maintenance service.

Sales Management

Papers at E.D.A. Conference

OVER three hundred people attended the 1947 sales management conference of the British Electrical Development Association on May 7th, 8th and 9th at the Connaught Rooms, London. At the opening of the proceedings, MR. V. W. DALE, general manager of E.D.A., gave an introductory talk to a discussion on "Public Relations and Consumer Services in the Electricity Supply Industry."

In the afternoon facilities provided by E.D.A. for giving technical service and advising consumers on the utilization of electricity were outlined by MR. J. I. BERNARD, chief technical officer of the Association. Pointing out that E.D.A. acted as a clearing house for information between manufacturers, the Electrical Research Association, the British Standards Institution, Government Departments, supply authorities and consumers, Mr. Bernard mentioned some typical abstruse problems under consideration—floor heating to give better comfort conditions with the possibilities of local thermal storage, variation of comfort temperature with the seasons, criteria of effective contact of plug pins and sockets, automatic time control *versus* thermostatic control for certain purposes, possible applications of infra-red rays for personal warming, the heat pump, commercial applications of radio-frequency heating, and the effect of production requirements for heating and power on the operation of back-pressure generators.

Projected Courses

An Architects' Advisory Service had been developed and various technical training facilities were being provided. An electric water heater design course had been held recently and other subjects on which courses might be held were farm electrification, space heating, commercial cooking, appliance repair and maintenance and industrial heating and power. Until the establishment of the E.D.A. Testing House for the approval of appliances which awaited the formulation of the necessary B.S.I. tests, faults of appliances judged to be unsatisfactory would be taken up with the manufacturers with a view to voluntary rectification.

On the evening of May 7th the delegates to the conference were shown six E.D.A. films.

MR. J. A. STEDMAN (E.D.A.), on May 8th, outlined the staff training facilities afforded by the Association which included assistance in the organization of lectures and discussion groups; the salesmanship diploma scheme; public speaking competitions; conferences, etc.

Speaking on staff training within the industry, MR. C. F. WELLS (Yorkshire Electric Power Co.), said that to-day there were more than a hundred domestic electrical appliances, apart from industrial electrical plant. It was desirable to have specialists dealing with many of these, not solely or even primarily for the purpose of bringing initial negotiations to a successful conclusion but for the more important purpose of ensuring the continued satisfaction of the consumer. After indicating the technical and commercial qualifications needed by sales engineers, Mr. Wells suggested suitable short-term courses of training.

School Heating

The advantages of electric heating for schools were commented on by MR. SIDNEY LOWETH, Kent county architect. At present, he said, it might be very difficult in many districts to heat buildings by electricity but the time would surely come when this would be done. The use of electricity simplified additions and alterations to existing services and considerable freedom of planning was achieved by the absence of boiler and fuel chambers, etc. The placing of electric heating units could be arranged to free the walls for fittings. Fuel was saved by not having to keep the heating apparatus in operation when the school was not in use, and freezing of radiators, etc., was eliminated. There were further savings in buildings, roadways for delivery of fuel and removal of ashes, and maintenance. Better heat control was also achieved.

On the subject of electric vehicles MR. R. C. HAWKINS (E.D.A.) said that it was a great mistake in assessing their merits and demerits to regard them as competitive with petrol vehicles. Points specially in their favour were their advertising value (they were essentially "modern"); their suitability for food delivery owing to their cleanliness, freedom from fumes and pollution, and quietness; reliability (few moving parts to go wrong); quick starting; low running and maintenance cost; and long life.

Assuming that one-third of the commercial vehicles could be changed over to "electrics," a conservative estimate, there was a potential market for 102,000 vehicles. There were also further possibilities for their use on farms; by the Services for camps, aerodromes, ordnance depots, etc.; for refuse collection and street cleaning; and for warehouse and station transport. The electricity supply industry could do a great deal to influence the choice of the potential purchaser.

The importance of "circulation" in showroom design and layout was stressed by MR. C. WARRENNE (E.D.A.). The showroom, the main function of which was service to the consumer, must be planned to allow free movement for visitors and assistants. Anything

suggesting an obstruction to this free movement should be avoided. Visitors would not get the impression of being welcome if upon entering they met any kind of physical barrier. But it was equally important to avoid a large open area with an isolated walk to the inquiry or accounts counter or a display. There should be maximum scope for "changeability" and for special feature shows. Care should be taken neither to overcrowd nor underdress the windows. A window-back had a very definite contribution to make to a successful display without becoming an actual feature. Colour played an important psychological part.

MR. E. G. QUESTED, a member of the Milk Marketing Board, declared that no industry had greater need for electricity than dairy farming. The biggest problem confronting farmers to-day was that of labour and the only solution was mechanization, for the achievement of which electricity was all-important. Electricity was the ideal foundation for all mechanical aids to the production of clean milk.

In England and Wales there were about 157,000 milk-producing herds, of which about 100,000 consisted of fifteen cows or less. No figures were available for the number of dairy farms receiving electricity supplies but the proportion was lower than the figure of 27·1 per cent given for the farming industry as a whole.

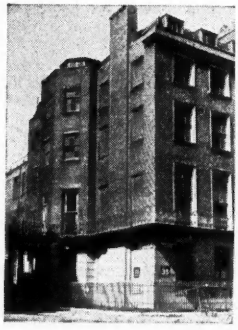
Speaking on the latest applications of photography in the laboratory and workshop, MR. W. WHITE (E.D.A.) referred to the use of the electronic discharge lamp which enabled an exposure of 1/10,000th sec to be given. By providing complete records of experiments and processes, especially when used in conjunction with the microscope and spectroscope, photography proved itself indispensable to the research worker. The processes of photolofting, photostat, microcopying, and reflex-copying were also being widely used both in engineering and administration.

Mr. Dale presided at the conference luncheon at the Connaught Rooms on May 9th. He said that although it was a rule that no speeches should be delivered at the luncheon, he thought that the delegates would like a few words from Miss Caroline Haslett. MISS HASLETT in the course of a brief speech thanked E.D.A. for the great support it had given to the Electrical Association for Women and said that it was the duty of those in the electrical industry to keep the electrical idea alive in spite of present restrictions.

MR. H. F. CARPENTER, chairman of the E.D.A. Council, also spoke briefly saying that, after all, the Association's main task was to encourage sales. He said that he had just returned from Canada and was still "seriously suffering from Canadian hospitality." He had seen several domestic kitchens in the Dominion which were just like those which, in this country, were wheeled about from place to place as an example of what kitchens should be.

New E.A.W. Headquarters

IN September last year, with the disposal of the lease of 20, Regent Street, W., which had been the headquarters of the Electrical Association for Women for fourteen years, the Association had to look around for new premises and through the kindness of the Central London Electricity, Ltd., 35, Grosvenor Place, S.W.1, was made available. The building was empty during the greater part of the war, and suffered considerable damage from enemy action. As Miss C. Haslett, Director of the Association, explained at a pre-view last week, the transformation of these premises into headquarters worthy of the Association was a difficult task under present-day restrictions, and much improvization and ingenuity were required to make them habitable. Only essential repairs and redecorations have been possible, but nevertheless the Association has successfully managed to make the interior both comfortable and attractive.



The E.A.W.'s New Premises

On the ground floor the main large room in the front of the building has been converted into a members' room with tasteful decoration and furnishings. Behind this room are working and demonstration kitchens, the lay-out for which was planned by Mrs. Adie Ballantyne, the kitchen-planning expert. These have been equipped with electrical apparatus lent by many electrical manufacturers for demonstration and for practical purposes, fluorescent lighting adding a modern touch.

The Association, during the twenty-two years of its existence, has promoted domestic electrical education, and it finds that under the present fuel restrictions its work in spreading the knowledge of the economic and efficient use of electricity is of even greater importance. In furtherance of this aim a room has been set aside in which domestic appliances are exhibited, illustrating how the careful use of these appliances can ensure economies in power consumption. The offices of the Association are accommodated on the floors above.

Meeting Increased Demands at the Brook Works

DESPITE a very substantial increase in production of electric motors since before the war, the demand greatly exceeds the supply. Hampered though they are by shortages of materials, manufacturers are doing all in their power, by the use of alternative materials and by introducing still more up-to-date methods, not only to step-up their output but also to improve the quality and reliability of their products at the same time.

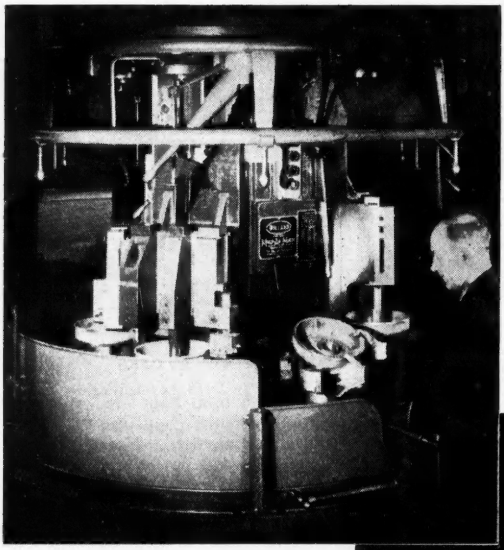
During its fifty years' existence Brook Motors, Ltd., which claims to be the world's largest exclusive maker of a.c. motors, has produced more than three-quarters of a million motors in sizes from ¼ to 250 H.P. in 20,000 different types. Over the past five years the output has increased from 600 motors a week to 3,750, an increase of 600 per cent, and to-day, so the advertisements say, the company turns out "A Motor a Minute" throughout its working day. Actually this latter claim is a conservative one and probably about 50 seconds would be a more exact figure.

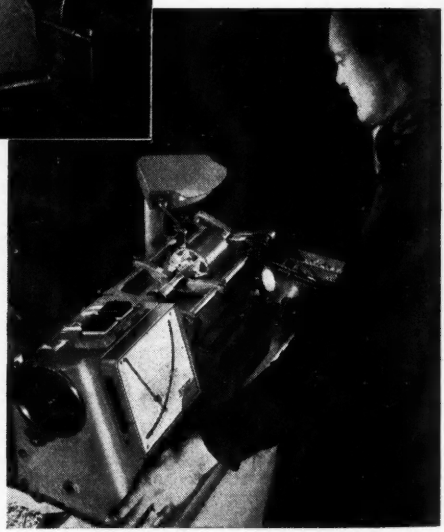
To obtain this result there has been a very considerable expansion of productive capacity during recent years and the number of employees has been increased to nearly 2,000. Since the beginning of the war the factory area has been trebled, there now being five works at Huddersfield and one at Barnsley with a total floor area of 276,500 sq ft. Methods throughout the works have been entirely modernized. Nearly two miles of gravity roller and power conveyor are in use, in conjunction with a flexible method of production whereby the order for a single motor can be handled as easily as one for several thousand. Approximately 500 machine tools all of a specialized type and each used for dealing with one component only of an induction motor give an output of ten motors per person per month as compared with five in 1939.

Nearly 2,000 fractional-H.P. motors a week are made in one of the departments of the original Empress Works (now known as No. 1 works) constructed in 1916 and extended in 1928 and reorganization now in hand will increase this output considerably. These "Cub" motors, as they are called, are made in both single- and three-phase types, the components for each being distinguished by painting the former blue and the latter red.

Exceptional mechanical robustness of the rotors in these "Cub" units, as indeed in all other types of motor, is achieved by the incorporation of copper rods instead of windings, round bars being employed for single-phase and rectangular for three-phase. To assist starting torque the stampings are slightly staggered. The copper end rings are

electrically welded on to the end of the bars, forming an indestructible rotor with pure copper conductors. The stator shells are formed on a press in three operations to ensure perfect roundness, the joints arc-welded and the pressed steel feet attached by spot welding. Dynamic balancing of the rotors is employed. New six-spindle automatic machines turn the ends at a rate of one every 15 seconds, while a new automatic "de-tearing" plant removes the drops of paint which collect after components have been dipped ready for drying in the infra-red tunnel, thereby securing a more uniform finish.





Above: Bullard "Multi-matic" machines for boring and turning ends simultaneously to fine limits

Right: Dynamic balancing of a fractional-H.P. rotor

In the same factory a machine department handles the production of shafts and non-standard parts. The shafts are turned on specially designed high-speed multi-tool lathes and finished by plunge grinding controlled by photo-electric cells. Standard sub-components are produced on capstan and turret lathes. All parts leaving the machine shops are checked in an inspection department. Besides blacksmiths', joiners' and pattern making shops there is also here a jig and gauge department which includes in its varied equipment two up-to-date jig borers housed in a special room provided with air-conditioning. Incidentally conveyors, both of the belt and roller types, are employed very extensively to facilitate handling, photo-electric cells controlling them in many instances.

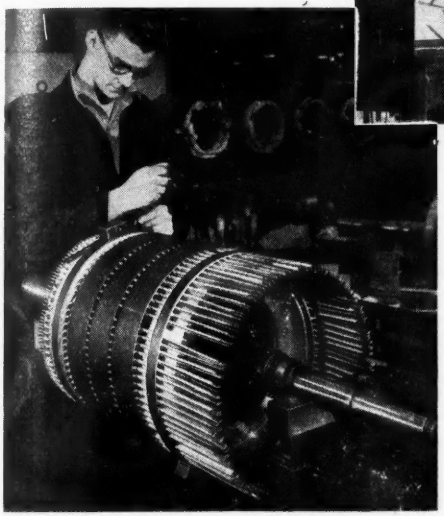
At all stages of manufacture motors are given routine tests and for these the electronic department supplies numbers of special instruments, including cathode-ray oscillographs for checking stator windings and oscillators for detecting short-circuits. This department also makes up photo-electric units used for the automatic control of the conveyors and is at the present time engaged on experimental devices for crack detecting and electrical comparators for measuring shafts, etc.

In the test and research departments all special and a certain percentage of standard motors are given a full temperature run on load. A test record is kept here of every motor made and there is a silence room

for specially quiet motors. All new designs are given a life test and for export models conditions of extremes of humidity and heat can be reproduced in a humidity chamber.

No. 2 works, reached by a tunnel under the main road, is engaged on yoke boring, stator building, dipping castings and turning, cotton covering and impregnation, sheet-metal work and plastic moulding. Multi-head boring machines are now replacing horizontal lathes for yoke boring and end turning, those used for the latter boring all holes simultaneously to fine limits at the rate of one a minute. Ten tons of wire a week are double cotton covered and impregnated.

Infra-red plant accelerates the drying of enamelled articles such as these starter cases



Bar winding a large slip-ring rotor

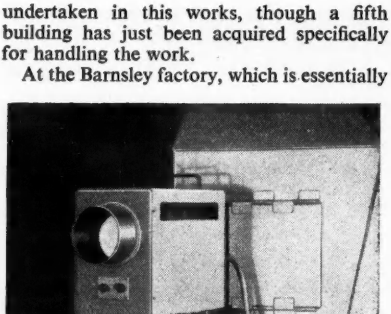
Presses of from 10 to 250 tons can produce complete fans in 30 seconds and complete boxes and covers from a sheet of metal in one draw. Several thousands of plastic mouldings are made daily including terminal boards, centrifugal switches, switchgear parts and, an exclusive feature of Brook motors, completely moulded slip-rings. Radio-frequency heaters preheat the pellets of plastic material ready for the presses.

Over 400 motors of from 1 to 25 H.P. are wound daily in the adjoining No. 3 works. After winding, the stators have all their joints welded. Tests both precede and follow the fitting of the terminal board and the units pass on to the varnish immersion tank. From this point a record of the motor is sent by teleprinter to three further departments. After baking in a continuous oven the winding receives two further sealing coats. Assembled rotors are electrically welded, painted, pressed on to shafts, turned and dynamically balanced before meeting the stator. The two parts then move along conveyors to one of the six assembly lines. After assembly the motors are tested, painted, finally inspected and labelled for dispatch. In the same building are made light switchgear for use with the smaller motors and various types of contactor and hand-operated starters.

The largest types of motors, of from 25 to 250 H.P., are made in No. 4 factory which was put into operation last May. The advantages of the bar-wound type slip-ring motors from the constructional point of view are particularly noticeable here, the unit being dipped in resin and solder, an operation which takes only a few minutes. Repairs, which in view of the difficulty of obtaining replacements continue to increase, are also

undertaken in this works, though a fifth building has just been acquired specifically for handling the work.

At the Barnsley factory, which is essentially



Cathode-ray oscillographs made in the electronic department are used extensively for circuit checking and fault finding

a motor winding factory, situated where suitable female labour is available, two hundred standard a.c. motors are wound every day. These are transported to Huddersfield for completion and assembly.

The entire works and machinery have been painted in conformity with suggestions made by the British Colour Council—structural steelwork, etc., in aluminium, and machines green, relieved with light yellow and maroon. A very active welfare department and first-aid rooms with qualified nursing staff are available, and the modern canteen serves 2,000 meals in a few minutes. About 400 employees are shareholders and take part in the profit-sharing scheme which has been in operation for twenty years. A comprehensive apprentice training scheme is also in existence.

Canadian Electrical Trade

Last year Canadian imports of electrical goods totalled $47,788,000, as compared with $43,052,000 during 1945. Included in these totals were radio apparatus $10,802,000 and $15,635,000 respectively. Canadian exports of electrical apparatus were valued at $20,939,000, compared with no less than $60,957,000 during 1945, the respective values of radio apparatus included in the total being $9,218,000, as compared with $35,949,000.

Next Week's Events

Monday, May 19th—

LONDON.—Institution of Electrical Engineers, Measurements Section. Convention on Automatic Regulators and Servo Mechanisms (May 19th-22nd).

Tuesday, May 20th—

BELFAST.—Queen's University, 6.45 p.m. Institution of Electrical Engineers, Northern Ireland Centre. Annual general meeting. "Radiolocation," by E. C. S. Megaw.

Wednesday, May 21st—

LONDON.—At the Institution of Civil Engineers, Great George Street, S.W.1, 6 p.m. Institute of Metals. May lecture on "Metallurgical Problems Involved in the Generation of Useful Power from Atomic Energy," by Sir Wallace Akers.

MANCHESTER. — Engineers' Club, Albert Square, 12.30 for 12.45 p.m. North Western Fuel Luncheon Club. Luncheon meeting. "Fuel Quality and Efficiency," by Dr. A. Parker.

Thursday, May 22nd—

HASLEMERE.—Admiralty Signal Establishment, Lythe Hill House, 5.45 p.m. Institution of Electrical Engineers, Southern Centre. "Frequency Modulation," by K. R. Sturley.

Friday, May 23rd—

DUNDEE.—Training College Hall, Park Place, 7.30 p.m. Institution of Electrical Engineers, Scottish Centre. Faraday Lecture by J. Hacking.

T.V.A. Finances

A MORE objective view than has been available so far is taken of the finances of the Tennessee Valley Authority in a report by the Government Accounting Office, described by the *Electrical World* as "the most disinterested agency to report on the controversial T.V.A. for a long time." The report commends the Authority's use of "accounting in management" comparing its methods favourably with well-managed private corporations, but it also recommends broad changes in T.V.A. accounting and financing practice.

It is considered that the T.V.A. should be required to repay all power investment with interest and should pay interest at the prevailing rates for long-term Government debt. It is noted that the Authority does not pay Federal income taxes but it is not recommended that it should pay them. The report declares that the Act under which the Authority operates has been interpreted so as to authorize the use of power revenues for capital purposes not specifically permitted by the Act and recommends the repeal of the section in question and the substitution of specific rules governing the Authority's borrowing and capital expenditure.

Registered Contractors

THE report of the Registration Board of the National Register of Electrical Installation Contractors, which was presented at the annual meeting held in London on Monday last shows that 238 applications for registration were received during 1946. The number of applications accepted was 139, applications declined, 43, and the number withdrawn, 7. Two temporary registrations were granted, one of which was subsequently withdrawn. During the year 139 certificates were issued, bringing the number on the Register at December 31st, 1946, to 1,202.

The inspection work of the Register has been confined almost entirely to new applicants, 224 having been visited and reported upon. During the war it has not been possible to carry out re-inspection of the work of certificate holders. With the increased number of applications for registration, it has been found necessary to fill the vacancy for a second inspector. Mr. H. C. Hazel the Register's inspector has resigned owing to ill-health. He is succeeded by Mr. J. C. Nicholson.

Since the last meeting it has been decided to widen the scope of the Association and invitations were extended to the E.A.W., the E.P.E.A. and the N.F.U. to be represented on the board. These invitations were accepted and Miss C. Haslett, Mr. W. E. Fry and Mr. W. A. H. Parker have been nominated as respective representatives. The E.C.A. has withdrawn its representatives from the board, but the E.C.A. of Scotland has re-affirmed its continued support of the Register. It is proposed to reconstitute the Scottish Committee.

Mr. F. W. Purse has accepted the new appointment of hon. director and the Executive Committee expresses its indebtedness to him for the work he is doing, and also to Mr. H. J. Cash, who with Mr. Purse has done much extra work on the Scrutinising Committee. Steps are being taken to reorganize the local advisory committees to ensure that all areas are adequately covered.

Annual Meeting

Mr. P. V. Hunter, the chairman, presented the report and accounts at the meeting. In referring to the appointment of Mr. F. W. Purse as hon. director, he paid tribute to the work Mr. Purse had done for the National Register since its inception in 1924.

Speaking of the work of Mr. H. C. Hazel, the Register's first inspector, Mr. H. J. Cash mentioned that in the early days of the Register some " border line " cases were admitted, who, once they got on the Register, did as they liked, and it was found necessary to set up an engineering inspector. His work had called for both tact and ingenuity and he had carried out his duties so successfully that many letters of appreciation had been received from contractors.

Mr. Hunter was re-elected chairman and Mr. E. A. Mills, vice-chairman for the ensuing year. Mr. Mills and Mr. W. A. Smith were re-elected to the Executive Committee, and Mr. D. B. Irvine was re-elected hon. treasurer. Sums of ten guineas each were voted to the I.E.E. Benevolent Fund and the Electrical Industries Benevolent Association.

Bankside Power Station

ENDEAVOURS to secure the rescission of the decision of the Minister of Town and Country Planning to consent to the erection of a new power station at Bankside (Southwark) by the City of London Electric Lighting Co., Ltd., are to be made in Parliament. Lord Llewellin is to call attention to the matter in the House of Lords on May 19th and the House of Commons is to debate the subject on the motion for the Whitsuntide adjournment.

The Southwark Borough Council passed a resolution of protest against the erection of the station at a meeting last week, calling upon Members of Parliament to support any steps to secure the revocation of the consent.

On Tuesday last the London County Council received a report from its Town Planning Committee upon the Bankside proposal. This recapitulated the proceedings at the public inquiry held in January and the Committee said it viewed the Minister's decision with the gravest concern because of the effect of such a station upon the view of St. Paul's and upon the re-development of the south bank of the Thames as proposed in the County of London Plan. The Committee questioned whether the substitution of oil fuel for coal in the proposed station would remove the objections on amenity grounds and regarded the erection of a power station on the site as a serious mistake. It recommended the Council to express to the Minister strong opposition to the scheme and urge that his decision be reversed.

The Council's Housing and Public Health Committee reported that it had lodged formal notice of objection to the proposed extension of the Bankside station.

Writing to *The Times*, Sir Giles Gilbert Scott, O.M., designer of the new station, refutes the idea that the station will " blight its surroundings, overwhelm its neighbours, and render superior development and fine planning impossible." He says that the station will be unlike any other in the world; it will emit no smoke or grit, will have no coal dumps or derricks and its height will be lower than the adjoining office blocks or flats and cannot therefore compete with or obstruct the view of St. Paul's.

He contends that town planning cannot ignore fundamental practical requirements. Bankside, Rotherhithe and a number of other Thames-side stations are needed, but possible sites are limited. Here there is a direct challenge to planners and designers, and Sir Giles refuses to believe that it cannot be met.

ELECTRICITY SUPPLY

Siting of Southwick Extension. West Hartlepool Rebate.

Brighton.—EXTENSION SCHEME APPROVED.—The Corporation's plans to extend the Southwick generating station have been approved by the Electricity Commissioners. Southwick Urban District Council, which objected to the proposal to extend the station westward, has been informed by the Commissioners that they had considered the possibility of siting the main building of the extension as far east as practicable, but had decided to approve the siting as originally proposed. Regarding the preservation of rights of way, they regarded the assurances given as satisfactory.

Cheltenham.—STREET LIGHTING.—The Council has decided to transfer the functions in regard to public lighting from the Electricity Committee to the Street and Highway Committee. The Electricity Committee will advise the Street and Highway Committee and the borough electrical engineer will continue to be the responsible officer for street lighting.

SERVICES TO NEW HOUSES.—The Council has confirmed a recommendation from the Housing and Electricity Committees that a charge of £5 10s. should be made towards the service costs of each new house, this representing approximately half the cost of the services. Previously no service charge had been made where electricity was used for cooking or water heating, the full charge being payable in all other cases.

Congleton.—NO INCREASE IN CHARGES.—Although there was a net deficit of over £2,000 on Congleton's electricity undertaking last year the Town Council, at its meeting on May 5th, decided not to increase the tariffs.

Millom.—COMMISSIONERS AND CHARGES.—The Electricity Commissioners have informed the Rural District Council that they are not satisfied that they would be justified in recommending the Minister of Fuel and Power to approve the proposed 10 per cent increase in the Council's charges. The matter may be reconsidered in the light of the results for 1946-47 and a revised estimate for 1947-48.

Skye.—INAUGURATION OF SUPPLY.—The North of Scotland Hydro-Electric Board on May 6th inaugurated the distribution scheme at Kyleakin. Electricity is conveyed to the island by submarine cable from the Board's temporary Diesel station at Kyle of Lochalsh. Lady Hugh MacKenzie, Inverness, switched on the power. Later in the day an exhibition of electrical appliances was opened by General Sir Torquil Matheson.

South Shields.—DISTRIBUTION SCHEMES.—The Town Council has decided to erect a substation in the Quarry Lane area at a cost of £10,600 and application is being made for sanction to borrow this sum. Other electrical developments planned include £5,600 for a 11-kV supply and increase in capacity at the Chapter Row substation at Brigham and Cowans; £1,400 for changing over from single-phase to three-phase at the Ogle Terrace substation; £900 for supplying electricity to 54 houses; and £13,960 for a substation on the Bede Trading Estate.

Wallsend.—UNDERGROUND CABLES.—The Town Council has approved plans by the North-Eastern Electric Supply Co., Ltd., for a 6-kV underground cable along the embankment of the L.N.E.R. main line along the Coast Road to a substation in the Newcastle area; underground cables on the Westmorland Estate; and underground cables in streets west of Churchill Street.

West Hartlepool.—REBATE TO CONSUMERS.—A £25,000 rebate from the North-Eastern Electric Supply Co., Ltd., received by the Town Council is being passed on to electricity consumers in the form of a special 33⅓ per cent discount during the six months ending October 31st.

Willesden.—DISPUTE WITH COMPANY.—The *Kilburn Times* reports that with regard to improvements to the electricity supply to S. Smith & Sons (England), Ltd., the company will only sign the agreements if it is permitted to install stand-by private generating plant. The Council, however, is not prepared to alter its contracts to make this possible. At a meeting of the Council the chairman of the Electricity Committee (Alderman W. H. Ryde) said that the expenditure to be incurred would be little short of £10,000. It was decided to inform the company that no further steps could be taken until the agreements were completed.

Overseas

South Africa.—ELECTRICITY IN MINING AREAS.—The Minister of Economic Development has been asked by the Electricity Supply Commission to approve proposals for the establishment of an undertaking to supply electricity in certain areas of the Transvaal, Orange Free State and Northern Cape Province. The proposals involve a capital expenditure during the next three to five years of £1,250,000. In his report the chairman, Dr. H. J. van der Bijl, said that the Commission had been approached by the Free State Sub-Committee of the Transvaal Chamber of Mines for a supply of electricity to mines to be opened in the Odendaalsrust area. Applications had also been received for a supply to the premier diamond mine at Cullinan, a platinum mine and possibly for a platinum refinery in the Rustenburg district, as well as the municipality of Rustenburg.—*Reuter.*

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

British Insulated Callender's Cables, Ltd., reports a trading profit for the eighteen months ended December 31st last of £1,584,170, to which is added interest and dividends on investments, £651,806 and profit on realization of investments of £69,580, making a total of £2,305,556. Depreciation requires £486,442, directors' fees £47,988, N.D.C. and overseas taxation £98,751, and United Kingdom income tax £781,598. It is proposed to pay a final ordinary dividend of 6 per cent, making 10 per cent actual for the eighteen months. The balance carried forward, after providing £100,000 towards future taxation liabilities, is £191,756. The directors point out that the first accounts cover abnormal conditions arising from the British Insulated and Callender's amalgamation and also cover the bulk of the transition period from war to peace. By the payment of 10 per cent actual for the eighteen months, the distribution on the ordinary shares is maintained at the same rate as that paid in recent years by the former British Insulated and Callender's Companies.

Siemens Bros. & Co., Ltd.—In order to finance its extensive development programme the company proposes to make an issue of 1,000,000 4 per cent cumulative redeemable second preference shares of £1 each which will be offered to stockholders at the price of 21s. per share. The proposal will be submitted for approval at an extraordinary meeting to be held on May 30th. The issue has been underwritten and the consent of the Treasury has been obtained. In a circular to stockholders the company states that the orders in hand are satisfactory and 33 per cent of its total production is for export. The whole of the proceeds of the issue will be spent in this country with the possible exception of a few special types of machines which may be unobtainable here.

Ransomes, Sims & Jefferies, Ltd., report a net profit for 1946 of £84,302 (against £57,534 for 1945), after providing for taxation and transferring £69,410 (nil) to stock contingencies account. Comparison between the two years is disturbed by E.P.T. changes. The dividend on the ordinary stock is being maintained at 7½ per cent, the new stock ranking for one-third of this rate, and £63,323 (£64,133) is carried forward.

Pinchin, Johnson & Co., Ltd.—The accounts for 1946, which include the trading profits of five wholly owned subsidiaries liquidated during the year instead of the dividends hitherto paid by them, show a net profit of £907,085 (against £552,380 for 1945). A sum of £266,000 (£132,000) is reserved for income tax on the year's profits and £272,000 (£150,000) is provided for E.P.T.; £20,000 (nil) is also set aside for deferred repairs and £100,000 (nil) for use in 1947 against any loss which may accrue owing to the fuel crisis. It is proposed to pay a final ordinary dividend of 15 per cent (against 12½ per cent) together with a bonus of 5 per cent (nil), making 25 per cent (15 per cent) for the year, and £205,219 (£141,771) is carried forward.

Johnson & Phillips, Ltd., report a profit for 1946, after charging £52,910 (£51,316) for maintenance of buildings, plant, etc., of £373,178 (£313,108). Taxation provision amounts to £120,000 (£58,000), and the net profit is £159,820 (£162,821). A sum of £20,000 (same) is set aside for research and development and £50,000 (same) for special contingencies, but there is no allocation to dividend equalization reserve (last year £37,500). With a final dividend of 7½ per cent on the increased ordinary capital the total distribution for the year is maintained at 15 per cent, and £128,396 (£112,825) is carried forward. The premium of £450,000 derived from the issue to shareholders of 200,000 £1 shares at 65s. in November has been placed to general reserve, which is now £850,000.

Ever Ready Co. (Great Britain), Ltd.—As reported in our May 2nd issue the net profit for the year ended March 31st last amounted to £531,968 against £651,019 for 1945-46. After placing £79,583 (£213,628) to reserve and providing £14,000 (same) for the staff benevolent fund it is proposed to pay a final ordinary dividend of 25 per cent, making 40 per cent for the year, leaving £115,967 (£103,005) to be carried forward.

The chairman, in his statement issued with the accounts, says that the interruptions and dislocations during the fuel crisis resulted in heavy losses in production. Referring to the complete destruction by fire of the dispersal factory at Thornliebank, he states that two large factories purchased last year should soon redress and improve the production position.

Glenfield & Kennedy, Ltd., have declared a final dividend of 5 per cent and a bonus of 10 per cent, again making 20 per cent for the year. New shares issued in September rank for one third of the full dividend and bonus.

British Electric Traction Co., Ltd.—Total revenue for the year to March 31st last amounted to £823,261, compared with £795,422 for the preceding year. After deducting general expenses, etc., debenture stock interest and £305,005 (£316,350) for taxation the net revenue was £365,992 (£337,562). A final dividend of 35 per cent is recommended on the deferred ordinary, making 50 per cent for the year (against 45 per cent and a cash bonus of 10

per cent to mark the company's jubilee). A sum of £58,819 (£17,491) is transferred to undivided profits account.

The West London & Provincial Electrical & General Trust, Ltd., reports an income for the year ended March 31st last of £39,770, as compared with £34,336 for 1945-46, and a net profit of £16,821 (against £13,091). The final ordinary dividend is 4 per cent making 6 per cent for the year (same), plus a bonus of 1 per cent (nil). The balance carried forward is £5,298 (against £4,280 brought in).

The Plessey Co., Ltd., has declared an interim ordinary dividend of 10 per cent (against 15 per cent). The directors state that the reduction is made merely as a precautionary measure until they are able to assess more fully the fuel situation and its effect on the supply of raw materials.

The Rothermel Corporation, Ltd., reports a profit for 1946 of £24,862, as compared with £17,444 for the preceding year. It is proposed to pay a final dividend of 22½ per cent, making 35 per cent, less tax, for the year (against 22½ per cent).

The Sturtevant Engineering Co., Ltd., reports a net profit for 1946 of £63,249 (against £52,605 for 1945). The final dividend is 11 per cent, tax free, making 16½ per cent for the year (against 14⅜ per cent).

The Southern Areas Electric Corporation, Ltd., reports a profit for 1946 of £25,352, as compared with £26,445 for the preceding year. The dividend for the year is unchanged at 5½ per cent.

Simms Motor Units, Ltd., out of a net profit of £49,389 (against £49,347) is paying a first and final dividend of 10 per cent (same).

Radio Rentals, Ltd., has announced an unchanged interim dividend of 7½ per cent.

New Companies

Temco, Ltd.—Registered May 2nd. Capital, £50,000. To acquire the business of wire drawing and diamond die making carried on by Temco, Ltd. (in voluntary liquidation) and to carry on the business of manufacturers of wires, cables and all electrical apparatus and appliances, etc. Directors:—W. F. Randall and B. H. Musgrave (appointed by the Telegraph Construction & Maintenance Co., Ltd.) and Kathleen I. P. Smith and K. C. Smith. Regd. office: Stowfield Works, Lydbrook, Glos.

Tyler & Freeman, Ltd.—Registered May 7th. Capital, £10,000. Electrical engineers and contractors, etc. Directors: R. G. Tyler and C. P. O'Connor. Regd. office: 40, Chancery Lane, W.C.2.

John A. Parsons, Ltd.—Registered April 11th. Capital, £750. Electrical engineers, etc. Subscribers: J. A. Parsons and Mrs. Joan R. M. Parsons. Solicitors: Walton & Ray, Luton.

Lanalee, Ltd.—Registered March 13th. Capital, £1,500. To acquire the business of factors in all classes of electrical goods carried on by P. J. Lee and A. J. Lane at 21, The Drive, Harold Wood, Essex. Directors: P. J. Lee and A. J. Lane. Regd. office: 21, The Drive, Harold Wood, Essex.

D. A. Fisher (Electrical Contractors), Ltd.—Registered March 31st. Capital, £1,500. Directors: D. A. Fisher, J. C. Boyce and T. H. Bowes. Regd. office: 37, Pentrechwyth Road, Swansea.

G. Clifton & Co., Ltd.—Registered March 29th. Capital, £2,000. Electrical and mechanical engineers and contractors, etc. L. Adlington signs as director. Solicitors: Roythorne, Hammond & Turner, 5, Broad Street, Spalding.

Harry Southall Electrical Co.,Ltd.—Registered April 18th. Capital, £5,000. Electrical engineers and contractors, etc. Directors: H. Southall, H. Bells, W. L. Hughes and Mrs. Lillian D. Southall. Regd. office: 960, Bristol Road S., Northfield, Birmingham.

Bankruptcies

N. F. Peat & Sons, 28A, Blackheath Village, Blackheath, London, electrical engineers.—Receiving order made April 25th on a creditor's petition. First meeting May 16th at 20, Eaton Place, London, S.W.1. Public examination July 8th at the County Court, Scarbrook Road, Croydon, Surrey.

J. Hutchings, 16, Maynard Road, Leicester, trading as the Maynard Electric Service, electrician.—Receiving order made on April 30th on debtor's own petition. First meeting May 20th at the Official Receiver's office, 1, Berridge Street, Leicester. Public examination June 10th at the Castle, Leicester.

A. S. Britton, 9, Moorside Road, Heaton Moor, Stockport, radio engineer and electrical contractor.—Last day for receiving proofs for dividend May 20th. Trustee, Mr. A. T. Eaves, 47, Mosley Street, Manchester, 2.

W. A. Roderick, 25, Adare Street, Bridgend, Glam., electrical engineer.—Supplemental dividend of 17s. 11¾d. in the £ and 4 per cent statutory interest, payable May 28th at the Official Receiver's Office, 34, Park Place, Cardiff.

Liquidations

Etchells, Congdon & Muir (Holdings), Ltd.—Winding up voluntarily. Liquidator, Mr. J. A. Hulme, 18, Lloyd Street, Manchester, 2. The liquidator is authorized to divide amongst the shareholders of the company in specie all or any part of the assets of the company; in particular there may be so divided among the shareholders any shares held by the company in Etchells, Congdon & Muir, Ltd.

Wireless Electric (Wholesale), Ltd.—Particulars of claims by May 23rd to the liquidators, Messrs. A. Collins and N. W. Osborne, c/o Rushton Osborne & Co., 11-12, Finsbury Square, London, E.C.2.

STOCKS AND SHARES

STOCK Exchange markets and prices keep firm. A considerable amount of business is doing in what may be called the popular industrials. Next August, there will come into operation the doubled transfer stamp duty. For example, on 100 shares at 20s., the duty will be £2 instead of the present 20s., adding, in this illustration 6d. per share altogether to the cost-price of a purchase. It may be that investment has this in mind, and desires to avoid the additional duty. It may be, too, that Mr. Dalton's blunt and welcome statement in regard to the scaling down of debts which we owe to other countries, has served to increase confidence in our domestic stocks and shares. Whatever the reason, the gilt-edged market, and also that for the ordinary shares in the favourite industrial companies, show a fairly general advance in prices. Cable & Wireless ordinary is exceptional, with a fall of 7½ to 170, and Eastern Telegraph 3½ per cent preference, 147 a week ago, fell back to 127.

Cable Dividends

The British Insulated Callender's final dividend of 6 per cent fell below market expectations. After rising in anticipation of the announcement to over 50s., the price of the shares has come back to 47s. With the 4 per cent interim, the payment makes a total of 10 per cent for the eighteen months to last December. This is equivalent to a rate of 6⅔ per cent per annum, and makes the yield on the shares £2 16s. 0d. per cent.

The London Electric Wire announcement, which appeared last week, provides for the addition of a 2½ per cent bonus to the previous year's dividend of 7½ per cent. Net profits are shown in the preliminary statement to have risen from £87,000 to £157,700, of which £50,000 is being placed to general reserves. After a rise to 44s. 6d., the £1 shares offer a yield of £4 9s. 6d. per cent on the total dividend of 10 per cent.

Price Changes

Prices in the market for electricity supply shares have again remained virtually unmoved during the week. Electrical equipment shares are a good market, showing a number of further advances. A.E.I. remain in the van with another gain of 1s. 9d. to 88s. 9d. G.E.C., at 100s. 9d., and English Electrics, at 69s. 6d., are both higher, while Crompton Parkinsons have added 2s. 9d. to 35s. 9d. The telephone group shows up well, with Ericssons up to 47s. 6d., H.T.A. to 21s. 6d. and Automatic Telephones to £4. Enfield Cables and Henleys have moved up to 47s. 6d. and 27s. respectively. Reyrolles at 82s. 6d. have repeated the previous week's gain of half-a-crown and Telegraph Condensers have again made ground, to 36s. 3d. Plessey are 2s. 9d. down at 31s. 9d. on the reduction of the interim from 15 to 10 per cent, although this is described by the company as no more than a precautionary measure in view of the fuel situation.

New Siemens Capital

Siemens Bros.' proposal to increase the capital by the creation of a million new 4 per cent redeemable second preference shares will be put to a meeting on the 30th of this month. Subject to approval, the intention is to offer the shares to present stockholders at 21s. This will bring the total capital up to £4 millions. It consists at present of £2,450,000 ordinary and £550,000 10 per cent preference stock. The later is quoted at about 57s. 6d. per £1 unit. Siemens' annual report appeared, last year, early in June. The new issue has the object of financing developments, extensions and improvements. So far as ordinary dividends are concerned, the company's practice is to make a single payment annually. For the last ten years the rate has been 7½ per cent. The shares are quoted at 39s. 6d.

Oldham & Son

Introduced to the market by way of a placing at 11s. 3d. shortly before the Budget, Oldham & Son 1s. shares have risen during the past few weeks from 10s. 6d. to 12s. 3d. In the particulars published at the time of the introduction, a dividend of 60 per cent, for the year ending this month, was forecast. The prospective yield is, therefore, £4 18s. 0d. per cent. Recent buying of the shares is attributed in part to consideration of the benefits likely to result from the change in company profits taxation. Last year's E.P.T. liability was estimated by the company at about £100,000. Abolition of this tax, and the substitution of the new taxes on distributed and undistributed profits, are calculated by the issuing house to mean an increase in earnings from 65 to over 150 per cent on the £100,000 ordinary capital.

Morphy-Richards Issue

Last week's Morphy-Richards issue was an offer for sale of 150,000 1s. stock units at 25s. Total issued capital is £27,500, of which about 30 per cent is held by Reyrolles. Profits of the company, which manufactures electric irons, fires and other electrical appliances, are shown by the prospectus to have recovered sharply, during the last half of 1946, from those of the post-war reconversion period. On the basis of profits for those six months, less an allowance for the effects of February's fuel crisis, earnings for the year ending next June are estimated at not less than £140,000, which is equal to 317 per cent on the capital, subject to income tax and the new distributed profits tax. Without E.P.T., the same profit would represent earnings of 480 per cent. The directors anticipate the payment of a dividend of 160 per cent, which would give a yield of 6·4 per cent on the issue price of the shares.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

AKT. Ges. Brown, Boveri & Cie.—" Combined current and voltage transformer with closed iron cores." 7803/44. May 11th, 1943. (587402.)

British Electric Meters, Ltd., N. B. Coop and F. Wrigley.—" Electricity meters." 509. January 5th, 1945. (587339.)

British Thomson-Houston Co., Ltd.—" Synthetic resinous products from furfuryl alcohol." 2613/43. February 27th, 1942. (587350.) " Manufacture of stabilized vinyl resins." 4182/43. March 21st, 1942. (587444.) " Inter-polymerization products." 5287/43. April 11th, 1942. (587445.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Means for supplying unidirectional current impulses from an alternating current circuit to a welding or other load circuit." 5806. April 12th, 1943. (587393.)

British Thomson-Houston Co., Ltd., and T. X. Lewis.—" Control systems for electric power plants." 22873. November 17th, 1944. (587325.)

C. H. Broad and A. M. Jones (trading as Labgear).—" Appliances for use in making electrical tests." 536. January 5th, 1945. (587343.)

Carr Fastener Co., Ltd., and G. W. Clark.—" Holders for thermionic valves, plugs, and like electrical devices." 408. January 4th, 1945. (587330.)

Compania Para la Fabricacion de Contadores y Material Industrial Soc. Anon., and P. Viteau . — " Electric measuring systems." 11708. June 20th, 1944. (587459.)

Electroflo Meters Co., Ltd., and A. Smithson.—" Automatic control systems." 17948. September 20th, 1944. (587369.)

English Electric Co., Ltd., and R. W. Humm.—" Rotary adjustable electric regulating devices." 574. January 6th, 1945. (587383.)

English Electric Co., Ltd., and P. W. Seewer.—" Rotary hydraulic valves." 573. January 6th, 1945. (587382.)

D. C. Espley.—" Electrical carrier-wave systems." 21757. November 6th, 1944. (587498.)

General Motors Corporation.—" Refrigeration apparatus." 22932-3/44. November 20th, 1943. (587375/6.)

B. M. Hadfield . — " Thermionic valve oscillators." 19761. October 13th, 1944. (587419.)

W. T. Henley's Telegraph Works Co., Ltd., and P. Dunsheath.—" Floats." 16949. November 28th, 1942. (587440.)

W. T. Henley's Telegraph Works Co., Ltd., and H. A. MacDonald.—" Floats." 17848. December 15th, 1942. (587441.)

S. E. Matthews (Columbian Rope Co.).—" Load bearing ropes and like structures carrying electrical conductors." 24995. December 13th, 1944. (587507.)

Metropolitan-Vickers Electrical Co., Ltd., and W. G. C. Vance.—" Lifting jacks and the like." 12023. June 23rd, 1944. (587460.)

Okonite-Callender Cable Co., Inc.—" Electric cables." 11259/42. June 14th, 1941. (587349.) " Buoyant cables and electrodes therefor." 2388/43. February 14th, 1942. (587442.) " Buoyant electrodes for buoyant cables." 2389/43. February 14th, 1942. (587443.) " Buoyant electric cables and electrodes therefor." 21502/43. February 22nd, 1943. (587450.) " Buoyant electric cables." 1517/44. January 27th, 1943. (587451.)

Patelhold Patentverwertungs & Elektroholding Akt . - Ges . — " Crystal oscillation circuits." 6572/44. April 12th, 1943. (587399.)

Pirelli-General Cable Works, Ltd., and R. E. Horley.—" Fluid pressure cooling chambers associated with extrusion apparatus." Cognate applications 17927/44 and 3800/45. September 20th, 1944. (587367.)

A. G. Pocock.—" Electrical distance or height measuring systems and instruments." 33604/38. December 18th, 1939. (587389.)

Pye, Ltd., and J. Forman.—" Rangefinders or altimeters employing reflected wave energy." 11218. July 4th, 1940. (587390.)

H. B. Rantzen.—" Superposition of signals on electrical communication systems." 10244. June 24th, 1943. (587447.)

A. Reyrolle & Co., Ltd., and R. W. Wild.—" A.C. electric circuit-breakers of the gas-blast type." 19128. October 5th, 1944. (587491.)

A. Reyrolle & Co., Ltd., J. A. Harle and R. I. Morgan.—" Testing of electric insulation." 19129. October 5th, 1944. (587417.)

E. L. Ruddy Co., Ltd., and S. Denning.—" Electrode or contact housing for neon tubes." 21487. November 2nd, 1944. (587423.)

Sangamo Weston, Ltd., and G. E. Weston.—" Variable-ratio gear mechanism." 533. January 5th, 1945. (587342.)

Soc. le Carbone-Lorraine.—" Batteries of the alkaline electrolyte and electrolyte regeneration type." 3997/42. October 6th, 1941. (587470.)

Stackpole Carbon Co.—" Electrical condensers." 13419/44. July 3rd, 1943. (587409.)

Standard Telephones & Cables, Ltd.—" Piezo electric oscillation generator." 18682/44. November 9th, 1943. (587319.)

"Electric signal transmission systems." 12240/44. June 5th, 1943. (587405.) "Multiplex telephone system." 18684/44. October 19th, 1943. (587489.)

Standard Telephones & Cables, Ltd., and L. J. Heaton-Armstrong.—"Direction finders." 23751. November 28th, 1944. (587502.)

Standard Telephones & Cables, Ltd., and P. P. Atkins.—"Optical projection apparatus." 19788. October 13th, 1944. (587494.)

Standard Telephones & Cables, Ltd., and A. J. Maddock.—"Apparatus for heating by high-frequency electric currents." 15814. August 18th, 1944. (587361.)

Standard Telephones & Cables, Ltd., and C. N. Smyth.—"Electron discharge devices." 2505. February 15th, 1943. (587392.)

Telefonaktiebolaget L. M. Ericsson.—"Speed and distance measuring devices." 9393/44. May 17th, 1943. (587357.) "Cross bar selector arrangements." 626/44. January 13th, 1943. (587477.)

United States Time Corporation.—"D'Arsonval-type electrical measuring instruments." 22088/44. November 9th, 1943. (587424.)

Western Electric Co., Inc.—"Electric pulsing circuits." 14231/44. May 13th, 1943. (587464.)

Westinghouse Electric International Co.—"Magnetic members and material and coating compositions for use therewith." 22101/44. November 10th, 1943. (587374.)

G. E. D. Weston.—"Insulation of electrical conductors." 532. January 5th, 1945. (587341).

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Brighouse.—June 9th. Electricity Department. Two 11,000-V switchboards. (May 9th.)

Brighton.—June 2nd. Electricity Department. L.v. paper insulated mains cable for one year from July 1st, 1947. (May 9th.)

Bromley.—June 3rd. Electricity Department. L.v. and e.h.v. cables and three 750-kVA transformers. (See this issue.)

India.—MADRAS.—June 19th. Government Electricity Department. 11-kV and lower voltage switchgear and accessories. (May 2nd.)

Kent.—The County Council invites applications by May 31st from firms for inclusion in its approved list of contractors for electrical engineering works. (See this issue.)

Middlesbrough.—June 21st. Electricity Department. Street lighting equipment. (See this issue.)

Manchester.—May 27th. Electricity Committee. Petrol-electric mobile crane. (May 9th).

South Africa.—PRETORIA.—July 1st. City Council. Electric travelling cranes. (May 2nd.)

Tees Valley.—June 24th. Water Board Electrically driven centrifugal pumping plant, Contract No. 12. T. S. R. Winter, engineer to the Board, Corporation Road, Middlesbrough.

Walsall.—May 24th. Electricity Supply Department. Cable covers. (May 9th.)

Warrington.—June 30th. Corporation. Electrically driven sewage and storm water pumps, and two sludge pumping sets, for the Sankey Valley drainage scheme, Contract No. 7. John Taylor & Sons, Artillery House, Westminster, S.W.1.

West Hartlepool.—June 10th. Electricity Department. Eight 500-kVA transformers. (May 9th.)

Orders Placed

Durham.—County Council. Accepted. Installation of automatic telephones at Holywood Hall Sanatorium.—Telephone Rentals. Kitchen and bakery equipment at Lanchester Institution.—Peerless Electrical Mfg. Co.

London.—L.C.C. Housing and Public Health Committee. Accepted. Electric wiring and fittings in houses on various estates.—Newman & Watson (£2,234 and £2,791); Arch. Saville & Co. (£3,360); Electric Contracts (London), Ltd. (£814); Samuel Reed & Sons (£970); Ayr Engineering & Constructional Co. (£4,817 and £634); Iverson Electrical (£2,728); and City Electrical Co. (£1,303).

Watford.—Corporation. Accepted. Switches to accommodate new feeders required during the next two or three years (£10,209).—Metropolitan-Vickers Electrical Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Airdrie.—Extensions (£13,500) for Northwest Rivet, Bolt, and Nut Factory; manager.

Alloa.—Houses (100), Tullibody Road; Scottish Special Housing Association, Ltd.

Alton.—Extensions to senior council school; S. Low, county architect, The Castle, Winchester.

Bridlington.—Extensions and operating theatre at Lloyd Hospital, for the Committee; P. M. Newton, hon. architect, Crossways, Sowerby Road.

Cardiff.—Factory premises, Penarth Road, for L. & H. Ltd., Cardiff; builders, E. Turner & Sons, Ltd., Penarth Road.

Houses (300); city surveyor.

Daventry.—Permanent dwellings (32), Long Buckby; Sir John Brown, A. E. Henson & Partners, architects to R.D.C., 30, Billing Road, Northampton.

Devizes.—Houses (38) for T.C.; builders, L. Maslen & Sons, Ltd., F. Rendell & Sons, Ltd., and W. E. Chivers & Sons, Ltd.; plans, borough engineer, Town Hall.

Durham. — Factory, Sherburn Estate for Garner and Prestwick; Hadden & Hillman, Ltd., builders, 127, New Bridge Street, Newcastle-on-Tyne.

Factory for Mono-Containers, Ltd., at Sherburn; W. Moss & Son, builders, St. Mary's Place, Newcastle-on-Tyne.

Ealing.—Seven blocks of flats, Whitton Avenue, for T.C.; T. F Nash Construction, Ltd., Hayes.

Eastbourne.—Houses (44), Victoria Drive (£63,377), for T.C.; J. W. Ridge, builder, 42, Portland Street, Brighton.

Exeter.—Primary and nursery school at Summerway Avenue, Whipton; plans, city architect, Municipal Offices.

Featherstone.—Houses (100), for U.D.C.; W. H. Young (Ackworth), Ltd., Wakefield Road, Ackworth, Pontefract.

Halifax.—Junior and infants' schools, Cousin Lane, Ovenden; W. Usher, town clerk, Town Hall.

Hemel Hempstead.—Houses (38), on five sites; R.D.C. surveyor, 2, Marlowes.

Jarrow.—Factory, Bede Estate, for Meredith & Drew, Ltd., London; Hadden & Hillman, Ltd., builders, 127, New Bridge Street, Newcastle-on-Tyne.

Keighley.—Rebuilding and extensions to works, Market Street; J. H. Heaton, Ltd., Globe Ironworks.

Kidwelly.—Factory, Llanhadog, for the Wales & Monmouthshire Industrial Estates, Ltd.; Ashmore Contractors, Ltd., 10, Westgate Street, Gloucester.

Lichfield.—Factory, Trent Trading Estate, for Philday Cabinet Co., Ltd.; J. H. Deacon, Ltd., builders, Lombard Street.

Liverpool.—Secondary, junior and infants' school on Stocksbridge Lane, Aintree, for Lancs. E.C.; G. N. Hill, county architect, Preston.

March.—Technical school on 24-acre site, for Isle of Ely E.C.; county architect, County Hall.

Mitcham.—Extensions to Belting Mills, Church Road; plans, Barrow, Hepburn & Gale, Ltd., Grange Road, Bermondsey, S.E.1.

Morecambe.—Extensions to Queen Victoria Hospital; E. Morley, architect, 269, Swan Arcade, Bradford.

Morley.—Houses (180), Morley and Tingley, for T.C. (£233,408); Morley & District Building Trades Association, Ltd.

Nantile Valley (Caernarvonshire).—Wool factory; plans, Rural Industries Bureau, 35, Camp Road, Wimbledon, London, S.W.19.

Northwich.—Houses (52); J. Birtwistle, R.D.C. surveyor, Whitehall, Hartford.

Nottingham.—Completion of Bestwood School (£90,000); T. Bow, builder, Lamartine Street.

Oldham.—Additions to " D " block, Municipal Hospital, Boundary Park; A. L. Hobson, borough engineer, 75, Union Street.

Openshaw.—Additions to Steel Works, North Road; English Steel Corporation, Ltd.

Paisley.—Houses (300); Scottish Special Housing Association, Ltd.

Perth.—Houses (30), Almondbark, with electrical work, for C.C.; Ross & Cruickshank, architects, 22, George Street.

Portland.—Houses (50), Weston site; U.D.C. surveyor, Fortuneswell.

Romsey.—Houses (44), Alma Road (£55,899), for T.C.; A. G. Saunders, Ltd., contractors, 51, Belmont Road, Southampton.

Sherborne.—Houses (62), for R.D.C. (£90,884); C. P. Unwin & Sons, contractors, 12, Chessel Avenue, Bournemouth.

Skipton.—Houses (76), Park Avenue, Sutton; surveyor, Rural Council Offices.

Southend-on-Sea. — Houses (36), Eastern Avenue No. 5 site; borough engineer, Municipal Buildings Annexe, 30, Alexandra Street.

South Shields.—Two new infants' schools, for Corporation E.C.; plans, Howard Hill, 10, Winchester Street.

Stafford.—School on Silkmore Estate for Staffs. E.C.; A. C. H. Stillman, county education architect, County Offices.

Sunderland.—Rebuilding of furniture factory (damaged by enemy action) for P. Bergson; Stephenson & Gillis, Saville Chambers, Saville Row, Newcastle-on-Tyne.

Swansea.—Central depot at Pipe House Wharf (£54,328); borough engineer.

Tamworth.—Permanent houses (40), Amington Road (£47,628), for T.C.; J. Orton, builder, Summerfield Road.

Tredegar.—Houses (300) on several sites; U.D.C. surveyor, Bedwellty House.

Walsall.—Factory premises Bolt Lane; plans, Joseph Dixon Tool Co., Ablewell Street.

Westminster.—Four blocks of nine storey dwellings at Lupus Street, for City Council; plans, Powell & Moya, 36, Gt. Smith Street, S.W.1.

York.—Extensions to Mental Hospital, Clifton for North Riding C.C. (£42,620); J. Catchpole, county architect, County Buildings, Northallerton.